



POPULATION AND DEMOGRAPHIC PROCESSES IN 2018

Demographic situation in Bulgaria in 2018:

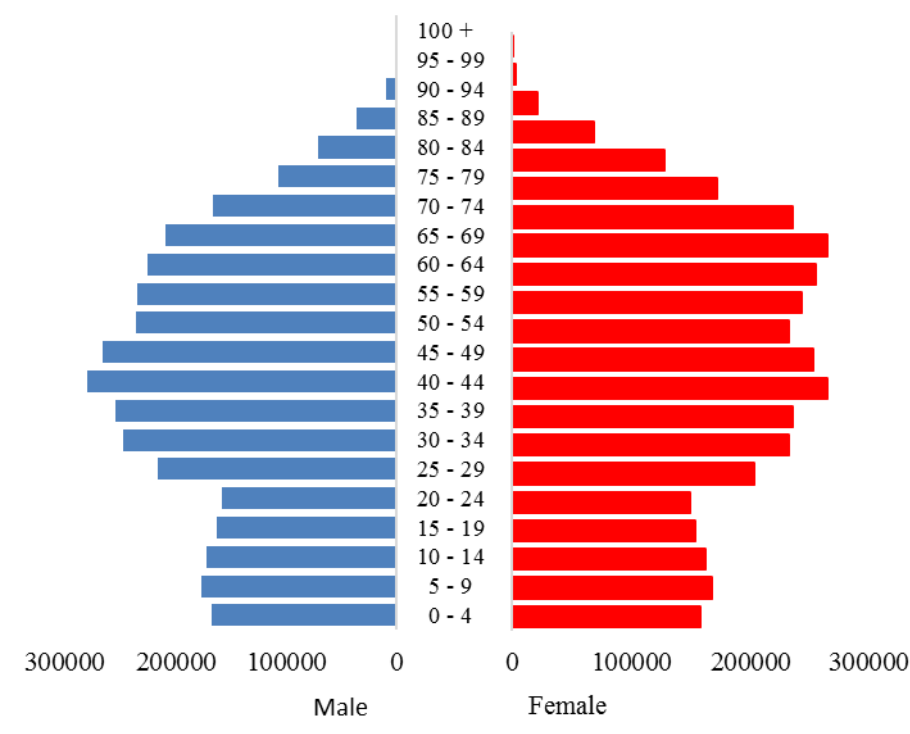
- Number of population decreases and population ageing continue;
- Unbalanced territorial distribution of population goes deeper;
- Number of live births and crude birth rate decrease;
- Number of deaths and crude death rate decrease;
- Infant mortality decreases;
- Number of marriages and number of divorces increase;
- Life expectancy at birth is unchanged.

Population number and structures

As of 31 December 2018 the population of Bulgaria is 7 000 039 persons representing 1.4% of the EU population¹. Compared to 2017, the country population decreases by 49 995 persons or by 0.7%.

Male population was 3 395 701 (48.5%) and female - 3 604 338 (51.5%) or to 1 000 males correspond 1 061 females. Males prevail among the population aged up to 53 years. The number and share of females into the total population have increased among the elderly.

Figure 1. Age structure of population as of 31.12.2018



¹ In the international comparisons, data on EU member states refer to 2017. Source: Eurostat - <http://epp.eurostat.ec.europa.eu/>.

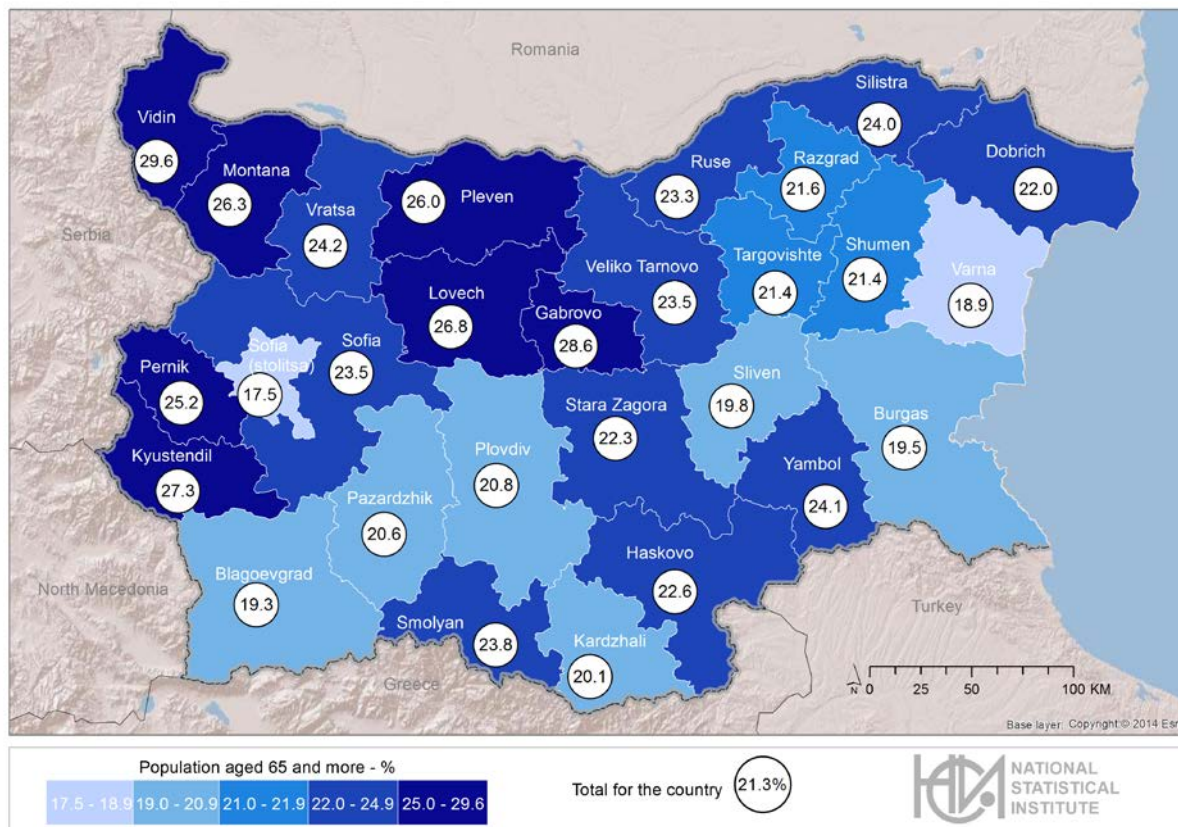


The process of population ageing continues. By the end of 2018 the number of persons aged 65 and over is 1 493 119, or 21.3% of the country population. Compared to 2017, the share of population aged 65 and over increases by 0.3 percentage points.

The population aging is more intensive among female population than among male. The share of females aged 65 and over is 24.8%, compared to 17.7% - of males. The difference is due to the higher mortality among male population and consequently - lower life expectancy.

The share of persons aged 65 and more is highest in districts Vidin (29.6%), Gabrovo (28.6%) and Kyustendil (27.3%). In 20 districts share of people aged 65 and over is higher than the country average. Lowest is the share of elderly population in districts Sofia (stolitsa) - 17.5% and Varna - 18.9%.

Figure 2. Share of population aged 65 and over by district as of 31.12.2018



Share of population aged 65 and over for EU-28 is 19.7%. Highest is the share of elderly population in Italy (22.6%), followed by Greece (21.8%) and Portugal (21.5%). In eight EU member states, including Bulgaria, share of elderly is above 20.0%.

As of 31.12.2018, **children up to 15 years of age in the country are 1 004 845 or 14.4% of the total population number.** The share of children up to 15 years increases by 0.1 percentage points compared to 2017.

The share of population under 15 years of age is highest in districts Sliven - 18.5% and Burgas - 15.6% of the district population. As a total, in 16 districts the share of children up to 15 years is lower than the country average. Lowest is the share registered in districts Smolyan - 11.5% and Gabrovo - 11.6%.



Share of the youngest EU-28 population in the beginning of 2018 is 15.6%. Lowest shares are observed in Italy (13.4%) and Germany (13.5%), and highest - in Ireland (20.8%) and France (18.1%).

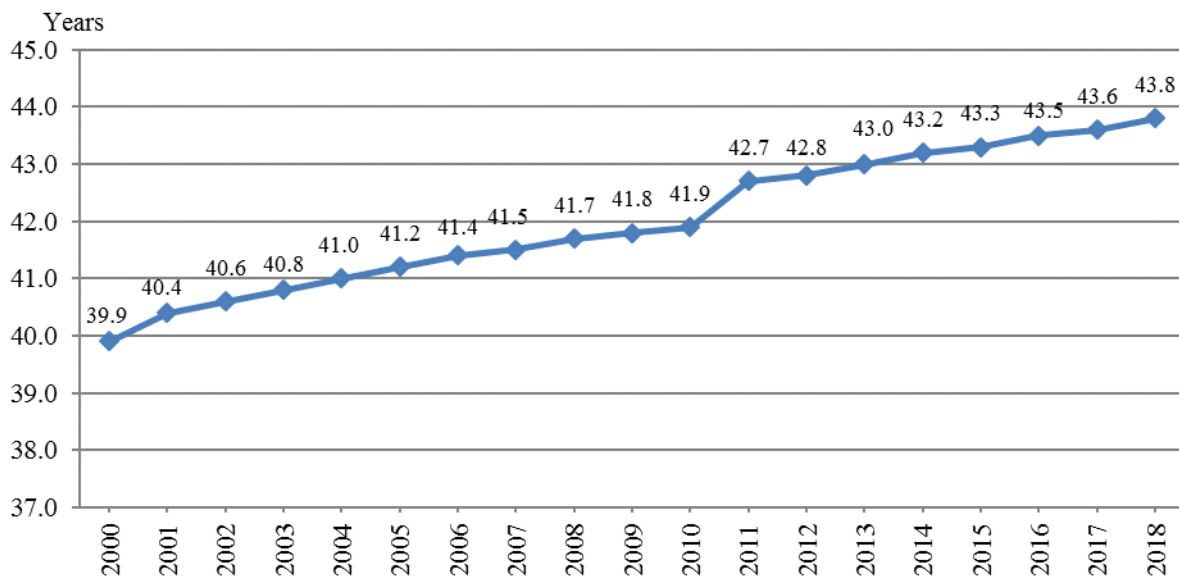
As of 31.12.2018, **the age dependency ratio¹** in the country was **55.5%**, or to each person in 'dependent' ages (under 15 and over 65 years) correspond less than two persons in 'independent' ages. In 2017 the ratio is 54.5% respectively.

The ratio is more favourable in urban areas - 51.5% than in rural - 67.8%. As a total, in all country districts except Sofia (stolitsa) - 47.1%, the age dependency ratio is over 50.0%. Most unfavourable is the ratio in districts Vidin (71.5%), Gabrovo and Lovech (67.4%) each.

The population ageing leads to increase of the population **mean age**. It has increased from 40.4 years in 2001 to **43.8 years at the end of 2018**.

Ageing of population is observed both in urban and rural areas. In urban areas, the mean age of population is 42.8 years, compared to 46.4 years - in rural areas.

Figure 3. Mean age of population



The tendency of population ageing influences the distribution of population **under, at and over working age**. The last are influenced not only by the population aging, but also by legislative changes² concerning the retirement age. In 2018, at working age are women up to completion of 61 years and 2 months and men up to completion of 64 years and 1 month.

The number of population at working age as of 31.12.2018 is 4 201 thousand persons or 60.0% of the total population, of which male are 2 206 thousand and female - 1 994 thousand persons. The population at working age decreased by almost 48 thousand or by 1.1% compared to the previous year.

¹ Number of persons in 'dependent' ages (persons under 15 years of age and 65 and more) per 100 persons in 'independent' ages (persons aged 15 to 64 years) calculated in percentage.

² Age limits used for distribution of population under, at and over working age are defined according to Ordinance on pensions and length of insurance, adopted by the Decree of the Council of Ministers No. 30 (State Gazette 21/17.03.2000).



By the end of 2018, the number of population over working age is 1 732 thousand persons or 24.8% and under working age are 1 067 thousand persons or 15.2% of the country population.

1. Population under, at and over working age as of 31.12.

(Per cent)

| Year | Age | | |
|------|-------------------|-------------|------------------|
| | Under working age | Working age | Over working age |
| 1990 | 21.6 | 55.5 | 22.9 |
| 1995 | 19.1 | 56.6 | 24.3 |
| 2001 | 16.3 | 59.2 | 24.5 |
| 2005 | 14.8 | 62.4 | 22.8 |
| 2010 | 14.6 | 62.7 | 22.7 |
| 2011 | 14.3 | 61.7 | 24.0 |
| 2012 | 14.4 | 61.8 | 23.8 |
| 2013 | 14.6 | 61.7 | 23.7 |
| 2014 | 14.8 | 61.1 | 24.1 |
| 2015 | 14.9 | 60.8 | 24.3 |
| 2016 | 15.0 | 60.6 | 24.4 |
| 2017 | 15.1 | 60.3 | 24.6 |
| 2018 | 15.2 | 60.0 | 24.8 |

The reproduction of population at working age is characterized by **the coefficient of demographic replacement**, showing the ratio between the number of persons entering working age (15 - 19 years) and number of persons exiting it (60 - 64 years). As of 31.12.2018, the ratio was 66. For comparison, in 2001 every 100 persons exiting working age have been replaced by 124 young people.

Most favourable is the ratio in districts Sliven - 87, Varna - 73 and Sofia (stolitsa) - 72. Lowest is the ratio in districts Smolyan - 43, Pernik - 49 and Gabrovo, where 100 persons exiting working age are replaced by 51 persons entering it.

Territorial distribution of population

As of 31.12.2018, 5 159 129 or 73.7% of the total country population reside in urban areas and 1 840 910 or 26.3% - in rural ones.

There are 5 256 settlements in Bulgaria by the end of 2018, of which 257 - towns and 4 999 - villages.

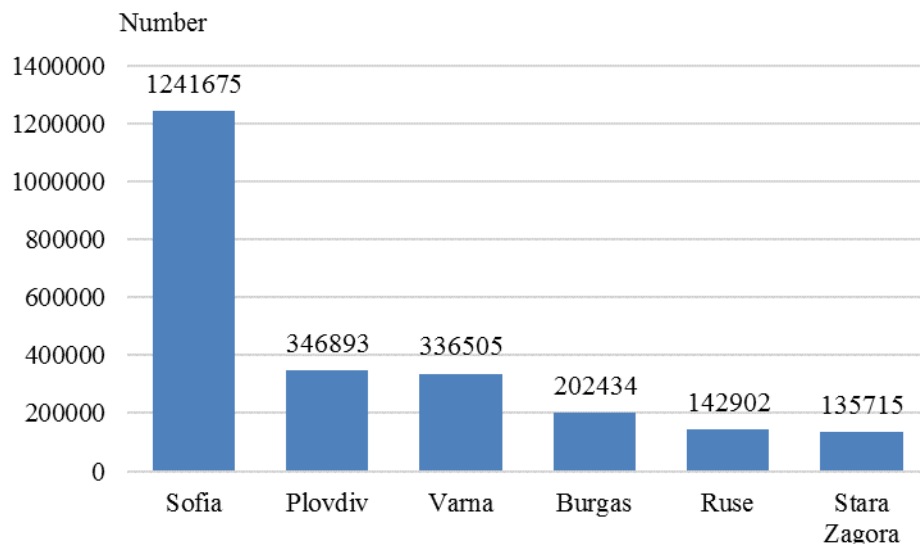
At the end of 2018, there are 164 settlements without population. Highest is the number of settlements without population in districts Gabrovo, Veliko Tarnovo and Kardzhali - 64, 55 and 11 respectively.

The population number is between 1 and 49 persons incl. in 1 193 or 22.7% of the settlements.



There are six towns with a population above 100 thousand persons and 34.4% of the country population lives there.

Figure 4. Towns with more than 100 000 inhabitants as of 31.12.2018



According to the country administrative-territorial structure, there are 6 statistical regions, 28 districts and 265 municipalities in Bulgaria.

Statistical regions

Half of the country population (50.2%) lives in Yugozapaden and Yuzhen tsentralen regions. Smallest according to the population number is Severozapaden region - 742 thousand persons or 10.6% of the country population.

The population number decreased compared to 2017 in all statistical regions; highest is the decrease in Severozapaden region - by 1.8% and lowest - in Yugozapaden region - 0.3%.

2. Population by statistical region as of 31.12.2018

| Statistical region | Population as of 31.12.2018 - in numbers | Population as of 31.12.2018 - % | Population growth - in numbers | Population growth - % |
|--------------------|--|---------------------------------|--------------------------------|-----------------------|
| Severozapaden | 742304 | 10.6 | -13652 | -1.8 |
| Severen tsentralen | 784168 | 11.2 | -10830 | -1.4 |
| Severoiztochen | 929035 | 13.3 | -4670 | -0.5 |
| Yugoiztochen | 1032079 | 14.7 | -7470 | -0.7 |
| Yugozapaden | 2102205 | 30.0 | -6189 | -0.3 |
| Yuzhen tsentralen | 1410248 | 20.1 | -7184 | -0.5 |



Districts

Lowest is the number of population in district Vidin - 84 865 persons or 1.2% of the country population and highest in district Sofia (stolitsa) - 1 328 120 persons (19.0%). Six districts have population above 300 thousand persons and in three of them, Sofia (stolitsa), Plovdiv and Varna, lives more than 1/3 of the total country population (35.3%).

3. Population by districts as of 31.12.2018

| Districts | Population as of 31.12.2018 - in numbers | Population as of 31.12.2018 - % | Population growth - in numbers | Population growth - % |
|------------------|--|---------------------------------|--------------------------------|-----------------------|
| Total | 7000039 | 100.0 | -49995 | -0.7 |
| Blagoevgrad | 305123 | 4.4 | -2759 | -0.9 |
| Burgas | 410331 | 5.9 | -1248 | -0.3 |
| Varna | 471252 | 6.7 | -868 | -0.2 |
| Veliko Tarnovo | 235708 | 3.4 | -3424 | -1.4 |
| Vidin | 84865 | 1.2 | -2062 | -2.4 |
| Vratsa | 162549 | 2.3 | -3096 | -1.9 |
| Gabrovo | 108404 | 1.5 | -1850 | -1.7 |
| Dobrich | 173831 | 2.5 | -2314 | -1.3 |
| Kardzhali | 152873 | 2.2 | 1760 | 1.2 |
| Kyustendil | 119041 | 1.7 | -2058 | -1.7 |
| Lovech | 124873 | 1.8 | -2088 | -1.6 |
| Montana | 129637 | 1.9 | -2577 | -1.9 |
| Pazardzhik | 255479 | 3.6 | -2486 | -1.0 |
| Pernik | 120880 | 1.7 | -1541 | -1.3 |
| Pleven | 240380 | 3.4 | -3829 | -1.6 |
| Plovdiv | 668334 | 9.5 | -1462 | -0.2 |
| Razgrad | 112229 | 1.6 | -1485 | -1.3 |
| Ruse | 218556 | 3.1 | -2780 | -1.3 |
| Silistra | 109271 | 1.6 | -1291 | -1.2 |
| Sliven | 186495 | 2.7 | -1938 | -1.0 |
| Smolyan | 105421 | 1.5 | -1861 | -1.7 |
| Sofia | 229041 | 3.3 | -2522 | -1.1 |
| Sofia (stolitsa) | 1328120 | 19.0 | 2691 | 0.2 |
| Stara Zagora | 316356 | 4.5 | -2711 | -0.8 |
| Targovishte | 111597 | 1.6 | -877 | -0.8 |
| Haskovo | 228141 | 3.3 | -3135 | -1.4 |
| Shumen | 172355 | 2.5 | -611 | -0.4 |
| Yambol | 118897 | 1.7 | -1573 | -1.3 |



Compared to 2017, the population has increased only in two district - Sofia (stolitsa) by 0.2% and Kardzhali by 1.2%. In all the rest, a decrease is observed, highest one in districts Vidin - 2.4% and Montana and Vratsa - 1.9% each.

Municipalities

The distribution of population by municipalities is not uniform. There are 73 municipalities with population below 6 000 and hardly 4.0% of the country population lives there. At the same time, there are nine municipalities with population over 100 thousand people and 41.3% of the country population lives there. Highest is the number of population of municipality Stolichna (1 328 120), followed by Plovdiv (346 893) and Varna (345 369). Lowest is the number of population of municipality Treklyano - 758 persons.

Table 4. Municipalities according to the population number as of 31.12.2018

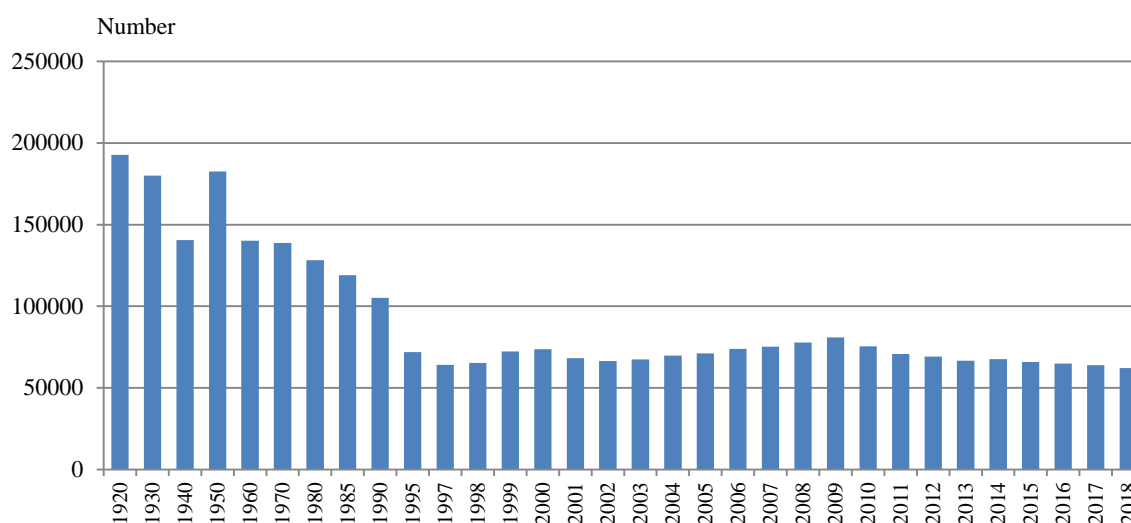
| Size of municipality | Municipalities | | Population | |
|----------------------|----------------|------------|----------------|------------|
| | Number | % | Number | % |
| Total | 265 | 100 | 7000039 | 100 |
| Up to 5999 | 73 | 27.5 | 277339 | 4.0 |
| 6000 - 19999 | 122 | 46.0 | 1379142 | 19.7 |
| 20000 - 49999 | 46 | 17.4 | 1395051 | 19.9 |
| 50000 - 99999 | 15 | 5.7 | 1057106 | 15.1 |
| 100000 and more | 9 | 3.4 | 2891401 | 41.3 |

Basic factors influencing the changes of population number and structures are the demographic processes - fertility, mortality and migration.

Fertility

There are 62 576 children born in 2018, of which **62 197 (99.4%) - live born**. The number of live births decreased by 1 758 children or 2.7% compared to the previous year.

Figure 5. Live born children within the period 1920 - 2018





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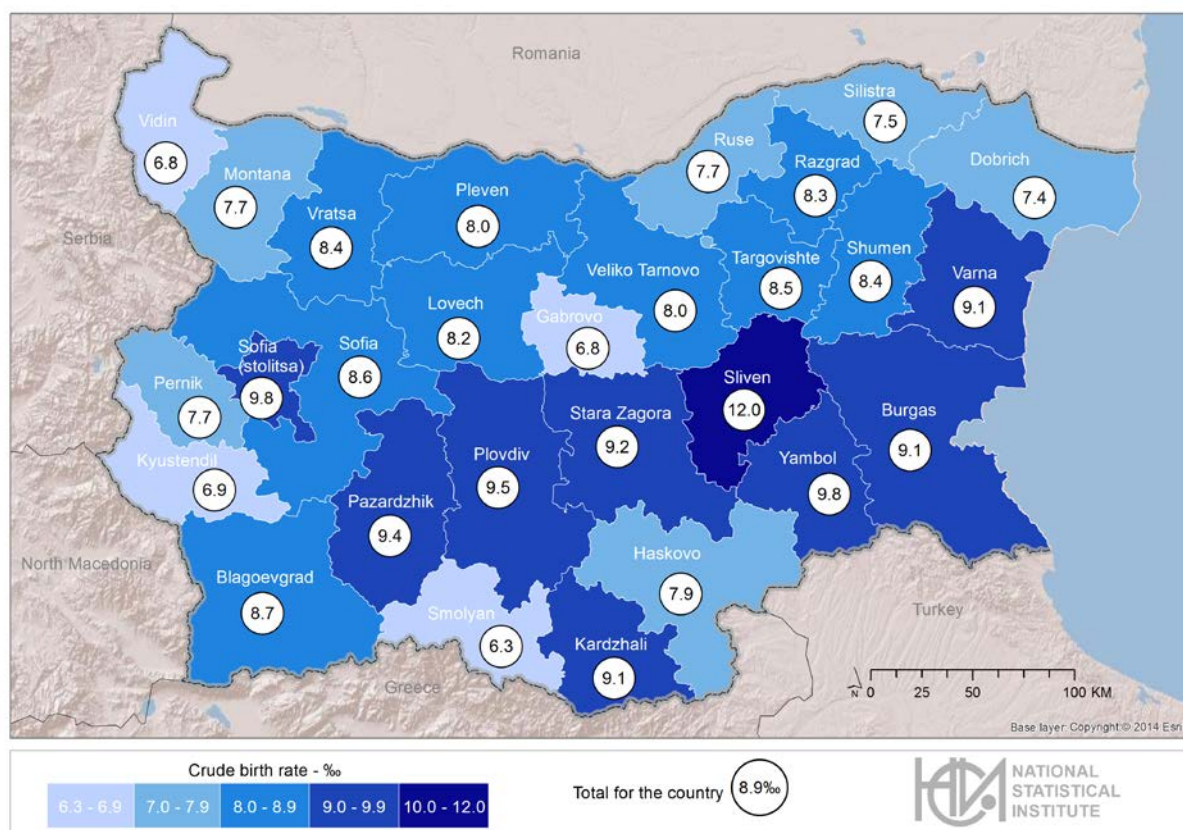
The crude birth rate¹ in 2018 is 8.9‰, compared to 9.0‰ in 2017.

The number of live born males (32 144) is by 2 091 higher compared to the live born females (30 053), or 935 females correspond to 1 000 born males.

The number of live born children in urban areas is 46 877 and in rural - 15 320. Crude birth rate in urban areas is 9.1‰ and in rural - 8.3‰.

In Bulgaria, highest is the crude birth rate in districts Sliven - 12.0‰, Sofia (stolitsa) and Yambol - 9.8‰ each. The crude birth rate is lower than the country average in 19 districts and lowest in districts Smolyan - 6.3‰, Gabrovo and Vidin - 6.8‰ each.

Figure 6. Crude birth rate by district in 2018

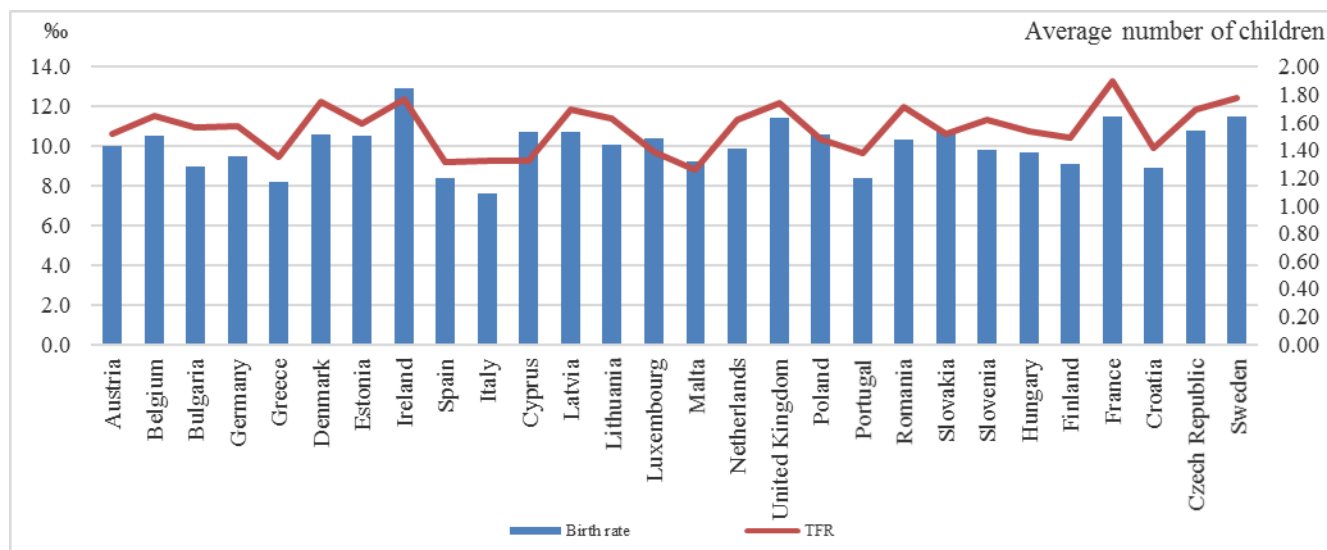


The crude birth rate in 2017 for EU-28 is 9.9‰ according to Eurostat data. Highest crude birth rate is observed in Ireland (12.9‰), followed by France and Sweden - 11.5‰ each. Lowest crude birth rate is registered in Italy - 7.6‰.

¹ Number of live born children per 1 000 persons of the average annual population during the year.



Figure 7. Crude birth rate and TFR in EU member states in 2017



The number of women in fertile age (15 - 49 completed years) or the size and fertility of the fertile contingents in the country influences considerably the fertility levels and the character of population reproduction.

The number of women in fertile age as of 31.12.2018 is 1 491 thousand. It has decreased with 26 thousand compared to the previous year and with 159 thousand compared to 2011.

The number of children born by mothers aged below 18 years in 2018 is 3 073. Tendency of increase the number of children born by mothers aged 40 and over continue - 2 108 in 2017 compared to 2 154 in 2018.

Half of births (50.1%) in 2018 are first ones, 37.1% second and 12.6% - third or higher of rank.

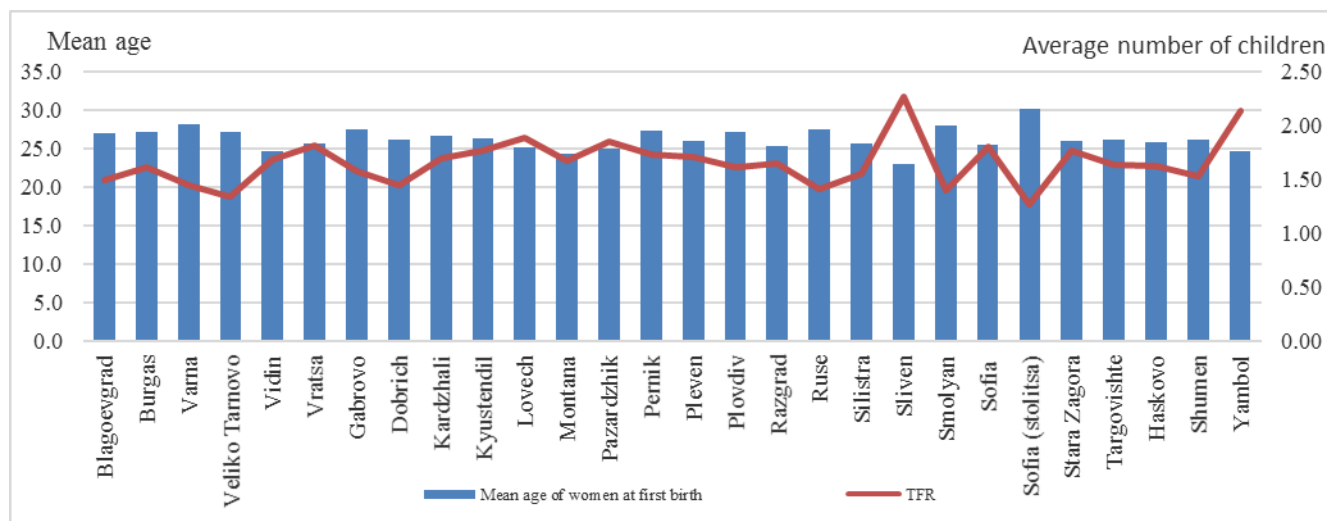
Total fertility rate (TFR)¹ is one of the basic indicators characterising the fertility. **The average number of live born children per women in 2018 is 1.56** and it is unchanged compared to 2017.

The mean age of women at first birth has increased from 27.1 in 2017 to **27.2 years in 2018**. Mean age of women at first birth varies from 30.2 in district Sofia (stolitsa) to 23.0 in district Sliven.

¹ Average number of live born children, whom a mother would give birth to during her entire fertile period according to the age specific fertility rates during the reporting year.



Figure 8. Mean age at first birth and TFR by district in 2018



There are 1 117 multi-foetal births registered in 2018 or 17 less than in 2017. In 1 107 of the cases, two children are born, in 10 - three children.

Stable tendency of increase of the number of extramarital births is observed since 1991. The share has increased from 18.5% in 1992 to 42.0% in 2001 and 56.2% in 2011. **The number of children born outside marriage in 2018 is 36 656 or 58.6%** of the total number of births. The share of extramarital births in rural areas (65.0%) is higher than in urban (56.5%). For 78.8% of the extramarital births data on the fathers exists, i.e. most probably the children are grown up in families by parents cohabiting without marriage.

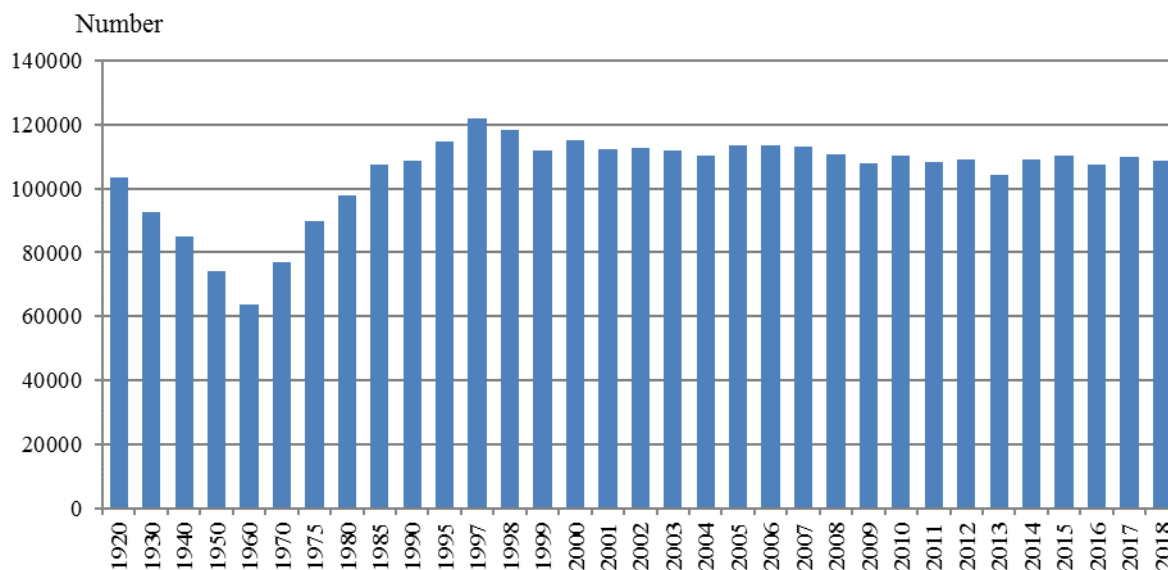
Highest share of extramarital births is registered in districts Vidin (79.2%) and Lovech (75.9%). The share of extramarital births in all country regions is higher than 50.0% except in districts Silistra (49.9%), Blagoevgrad (45.1%), Razgrad (45.0%) and Kardzhali - (35.9%).



Mortality

The number of deaths in 2018 is 108 526 and the crude mortality rate¹ - 15.4‰. Compared to the previous year the number of deaths has decreased by 1 265 or 1.2%. The crude mortality rate remains too high.

Figure 9. Deaths within the period 1920 - 2018



Mortality among males (16.5‰) continues to be higher than among females (14.4‰). In 2018 there are 1 081 deaths of males per 1 000 deaths of females. The considerable differences in mortality in urban and rural areas also remain unchanged. Mortality rate in rural areas (21.8‰) is higher than in urban ones (13.2‰).

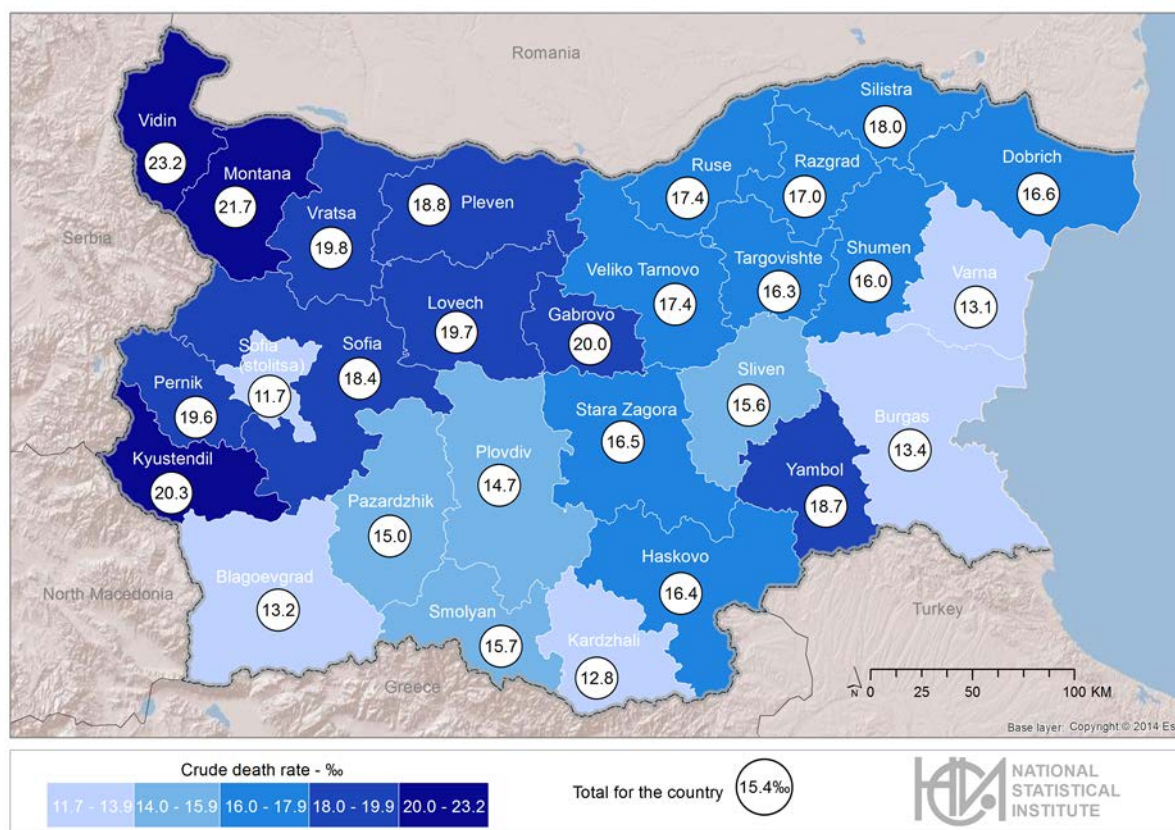
The mortality rate for EU-28 in 2017 is 10.3‰. Mortality rate in Bulgaria is highest among the EU member states. Lowest is the mortality in Ireland - 6.3‰, Cyprus - 7.0‰ and Luxembourg - 7.1‰. Except in Bulgaria, rather higher compared to the average EU-28 value is the mortality in Latvia - 14.8‰ and Lithuania - 14.2‰.

Highest is the mortality in districts Vidin - 23.2‰, Montana - 21.7‰ and Kyustendil - 20.3‰. There are seven districts where the mortality rate is lower than the country average. Lowest is the mortality rate in districts Sofia (stolitsa) - 11.7‰.

¹ Number of dead persons per 1 000 persons of the average annual population during the year.



Figure 10. Crude death rate by district in 2018



The premature mortality¹ in 2018 (21.0%) increased has compared to 2017 (20.9%). There are considerable differences in the premature mortality indicator for male and female population. The dead females aged under 65 years represent 13.8% of all dead females, while among the males it is 27.6%.

There are 358 children who die up to 1 year of age in 2018 and the infant mortality rate² is 5.8‰. The infant mortality rate was 14.4‰ in 2001 and 6.4‰ in 2017.

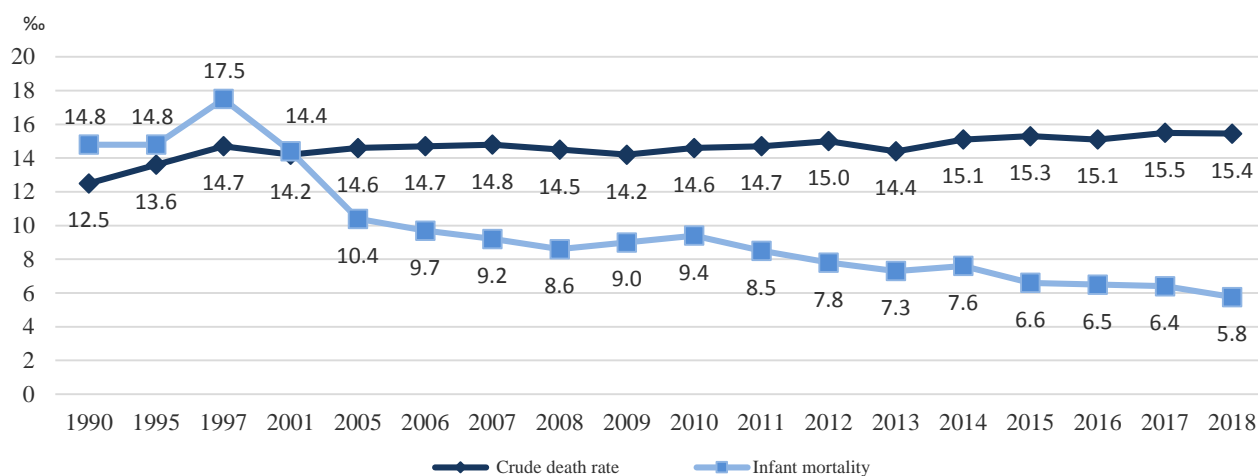
The infant mortality rate for 2018 is lower than the country average in 11 districts. Lowest values are registered in districts Smolyan - 1.5‰ and Sofia (stolitsa) - 2.7‰. Highest infant mortality rate is registered in districts Pleven (11.3‰) and Razgrad (10.6‰).

¹ Share of deaths of persons below 65 years of age of the total number of deaths.

² Number of children who die up to 1 year of age per 1 000 live born.



Figure 11. Crude death rate and infant mortality rate

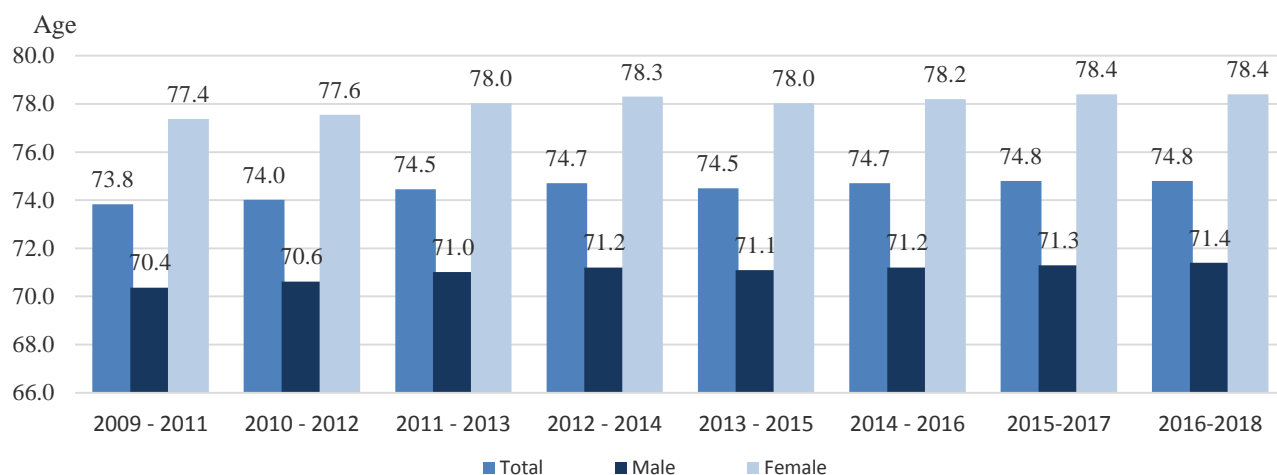


The different mortality rates among male and female population, as well as among the urban and rural population determine the difference in the life expectancy for separate population groups.

Life expectancy for the country¹, calculated for the period 2016 - 2018 is 74.8 years. Compared to the previous period (2015 - 2017) it is unchanged.

The life expectancy of male population is 71.4 years, whereas of female - 7.0 years higher or 78.4 years. The life expectancy of urban population (75.7 years) is higher than of rural one (72.8 years).

Figure 12. Life expectancy by sex and period



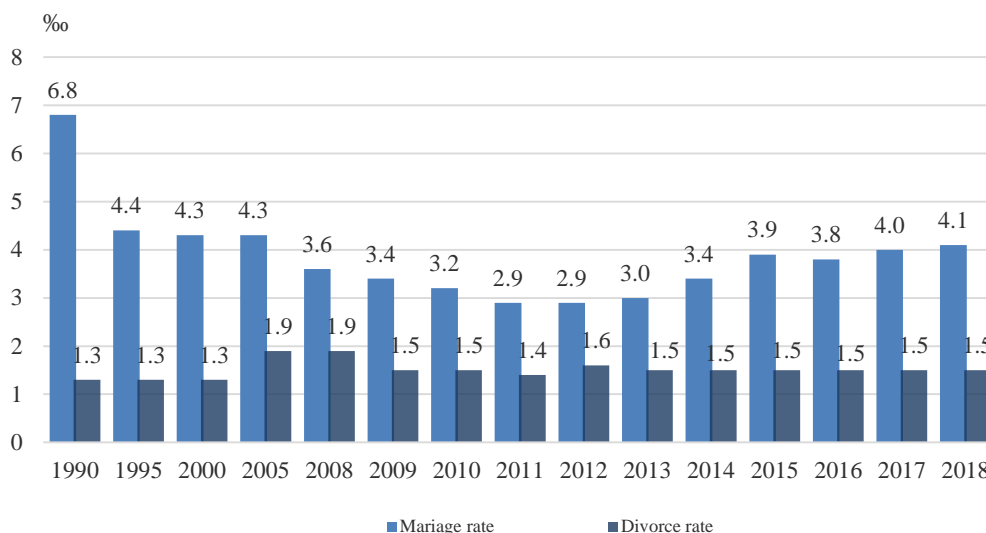
¹ Preliminary data.



Marriages and divorces

There are 28 961 juridical marriages registered in 2018, or 368 more than the previous year. The marriage rate¹ is 4.1%. Nearly three quarters of the total marriages number (21 463) are registered among urban population.

Figure 13. Marriage and divorce rates (per 1 000 population)



The mean age at first marriage in 2018 is 31.7 years for males and 28.7 - for females. Compared to the previous year, the mean age at first marriage has increased by 0.3 years for both - males and females.

87.0% of females and 86.2% of males have married for the first time in 2018.

Highest is the marriage rate in districts Dobrich - 5.4‰ and Razgrad - 5.1‰. Lowest is the marriage rate in district Pernik and Lovech - 2.6‰ each.

The number of divorces in 2018 is 10 596 or 185 more than in 2017. Out of the total number of divorces 80.4% refers to the urban population.

Highest is the number of divorces by 'mutual agreement' (65.9%), followed by divorces due to 'incompatibility of temperament' (26.0%) and 'virtual parting' (6.6%).

The divorce is not the first one for 9.4% of female and 11.0% of male who divorced in 2018.

The average duration of a marriage before the divorce in 2018 is 15.9 years.

Internal migration

109 810 persons change their residence within the country in 2018. Among the migrants within the country, 43.4% are male and 56.6% - female.

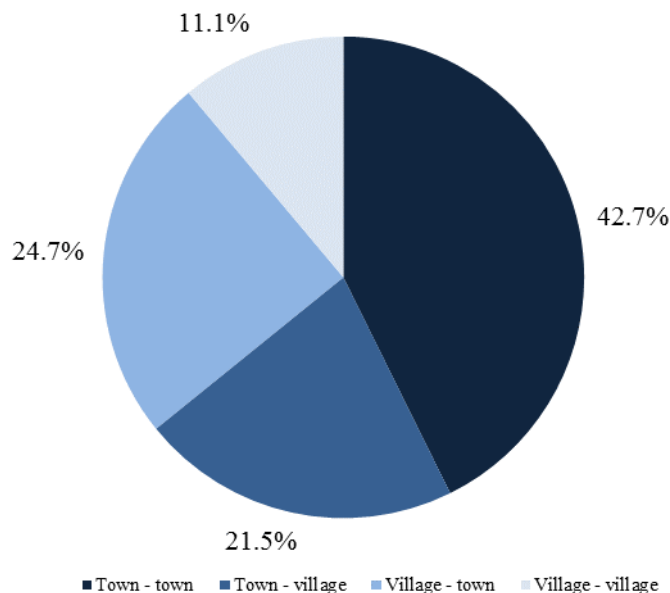
¹ Number of marriages per 1 000 population.



Highest is the share of internal migrants aged 20 - 39 years (33.9%), followed by persons below 20 years of age (31.3%) and 40 - 59 years old (16.6%).

The share of flow 'town-town' is highest one (42.7%), followed by the flow 'village - town' - 24.7% and 'town - village' (21.5%). Considerably lower is the number and share of the flow 'village - village' (11.1%).

Figure 14. Directions of the internal migration in 2018



Out of the internal migrants, highest is the number of people who migrated to Sofia (stolitsa) - 18 574. Districts with highest shares of migrants to Sofia (stolitsa) are Sofia - 9.9%, Blagoevgrad - 7.1% and Plovdiv - 6.0%.

Lowest are the shares of migrants to Sofia (stolitsa) from districts Razgrad - 0.7% and Targovishte - 0.9%.

International migration

33 225 persons change their current address in Bulgaria with an address abroad in 2018 - 51.4% male. Every second emigrant (49.4%) is aged 20 to 39 years. The youngest emigrants (under 20 years) are 15.8% of the total number and the emigrants over 60 years of age - 9.2%.

Most preferred destination countries are Germany (24.4%), the United Kingdom (17.8%) and Italy (7.5%).

Persons who change their address abroad with an address in Bulgaria, or the immigration flow, includes Bulgarian citizens who have returned to Bulgaria and citizens of other countries granted residence permit or status in Bulgaria. **There are 29 559 persons who changes their address abroad with an address in Bulgaria in 2018.** Male represent 49.3% of the total number of immigrants and female - 50.7%.

Among the immigrants to Bulgaria, 35.5% are aged 20 - 39 years and 27.6% - 40 to 59 years. The youngest immigrants (under 20 years) are 19.0% and the oldest, over 60 years of age - 17.9%.



Highest is the share of immigrants from Turkey (29.9%), the Russian Federation (11.0%) and Germany (7.2%).

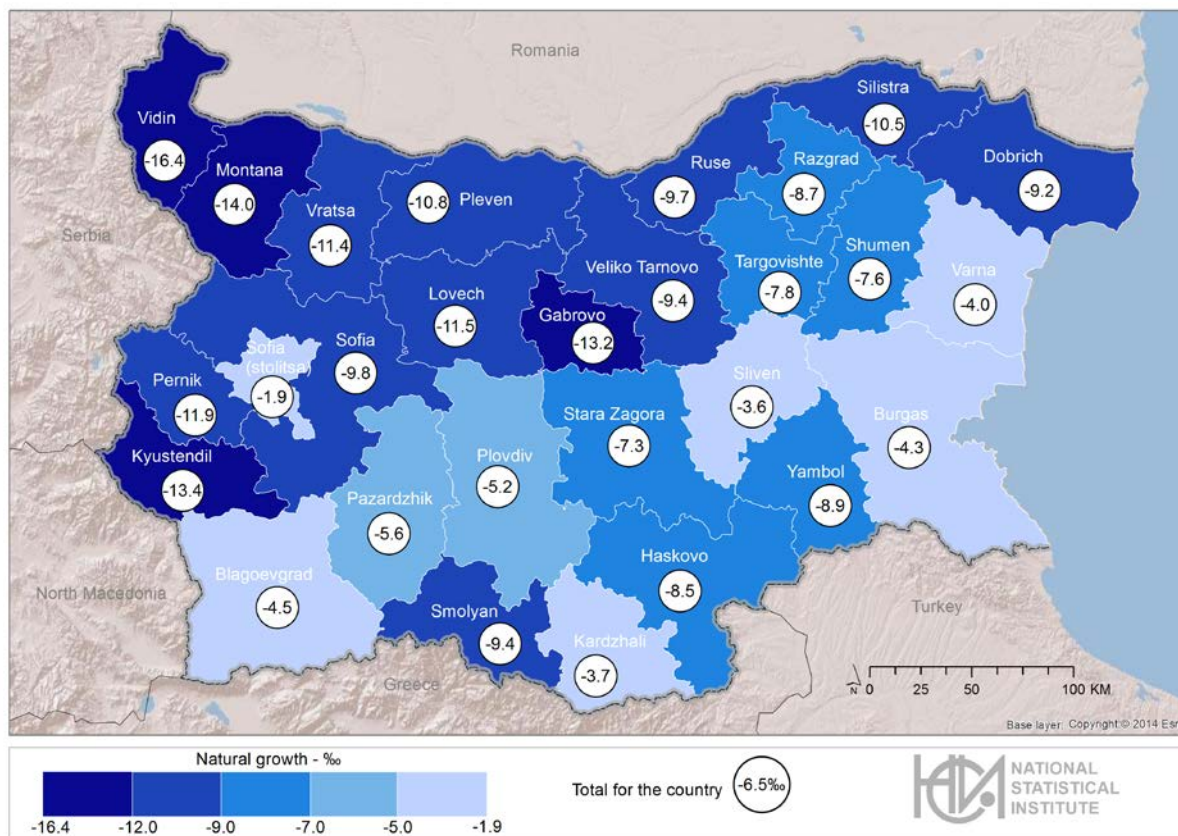
Population natural and migration growth

The population number and structures are defined by the size and intensity of the natural and migration growth.

The difference between the number of live births and deaths represents the natural increase of population. The country's demographic development after 1990 is characterised by a negative natural increase. **Due to the negative natural increase the country population decreases by 46 329 persons in 2018.**

The population decrease, measured through the natural increase rate is minus 6.5%¹. The natural increase rate in urban areas is minus 4.1‰, compared to minus 13.5‰ in rural areas.

**Figure 15. Natural growth by districts in 2018
(per 1 000 population)**



The natural increase in all country districts in 2018 is negative.

Lowest is the negative growth in districts Sofia (stolitsa) (-1.9‰) and Sliven (-3.6‰). Highest is the population decrease due to the high negative growth in district Vidin (-16.4‰), followed by Montana -

¹ Difference between the number of live births and number of deaths per 1 000 of the average annual population.



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minus 14.0‰ and Kyustendil - minus 13.4‰. Higher than minus 10.0‰ is the natural growth in nine country districts.

The natural increase rate for EU-28 in 2017 is minus 0.4‰.

In 13 EU member states the natural increase is positive and highest is the rate in Ireland (6.6‰), Cyprus (3.8‰) and Luxembourg (3.2‰). Except in Bulgaria, rather high negative natural increase is registered in Latvia and Croatia - minus 4.1‰ each and Lithuania (-4.0‰).

Net migration (growth due to international migration) influences considerably the population number and structures. The net migration growth in 2018 is also negative - minus 3 666 persons. The last is the difference between the number of immigrants and number of emigrants.

The decrease of population due to the international migration measured through the coefficient of net migration is minus 0.5‰¹.

There are six districts with a positive migration growth in 2018: Kardzhali (15.3‰), Shumen (4.1‰), Sofia (stolitsa) (3.9‰), Plovdiv (3.1‰), Varna (2.2‰), Burgas (1.3‰). Highest population decrease due to the negative migration growth is registered in districts Smolyan (-8.1‰), Vidin (-7.6‰) and Vratsa (-7.5‰).

¹ Ratio of the net migration to the average annual population.



Methodological notes

The population number and structures by the end of year are calculated based on the population data for the preceding year and data on the population natural and migration movement during the reference year.

Source of data on population number and structures is the Information System Demography of the NSI.

Data source on natural and migration movement of population (births, deaths, marriages, divorces, migration) is the Unified System for Civil Registration and Administrative Service of Population (Bulgarian acronym ESGRAON). Demographic events are registered through standard documents ESGRAON-CDS (Current Demographic Statistics): notification for birth, notification for marriage, notification for divorce, notification for death and address card for change of a present (current) address.

Data source on international migration are the Unified System for Civil Registration and Administrative Service of Population, document ESGRAON-CDS: notification for change of present address; National Revenue Agency; National Social Security Institute; Ministry of Interior; Estimates of emigration flows.

Data on population number and demographic events are distributed according to the administrative-territorial division of the country as of 31.12 of the reference year (settlements, municipalities, districts) and statistical regions according to the 'present address'. The last is the address corresponding to the residence declared by the person and officially registered.

The age of population by the end of year is calculated as of 31.12. in completed years.

The persons' age at occurrence of a demographic event is calculated in completed years based on the date of birth and the date of respective event, i.e. the age completed at the time of event.

The demographic indicators are calculated based on the average annual population. The last is an arithmetical average of the population number by the end of previous and the end of reference year.