

**EPIDEMIOLOŠKE KARAKTERISTIKE I TREND KRETANJA POROĐAJA U SRBIJI****Snežana Radovanović<sup>1</sup>, Milena Maričić<sup>2</sup>, Slađana Radivojević<sup>3</sup>, Predrag Stanojlović<sup>4</sup>, Divna Simović Šiljković<sup>5</sup>, Marija Mujković<sup>6</sup>, Mirjana Gazdić<sup>7</sup>**<sup>1</sup> Katedra za Socijalnu medicinu, Fakultet medicinskih nauka Univerziteta u Kragujevcu, Kragujevac, Srbija<sup>2</sup> Akademija strukovnih studija Beograd, odsek Visoka zdravstvena škola strukovnih studija, Beograd, Srbija<sup>3</sup> Dom zdravlja Topola, Srbija<sup>4</sup> Specijalna bolnica za hiperbaričnu medicinu, Vrnjačka Banja, Srbija<sup>5</sup> Dom zdravlja Gornji Milanovac, Srbija<sup>6</sup> Dom zdravlja Lapovo, Srbija<sup>7</sup> Specijalizant opšte medicine, Fakulteta medicinskih nauka Univerziteta u Kragujevcu, Kragujevac, Srbija**SAŽETAK**

**Uvod/Cilj:** U poslednjih nekoliko decenija pad stope fertiliteta je zabeležen u gotovo svim državama sveta. Cilj istraživanja je analiza epidemioloških karakteristika i trenda kretanja porođaja u Srbiji u periodu 2007-2016. godine.

**Metode:** Istraživanje je dizajnirano kao deskriptivna epidemiološka studija. Podaci su preuzeti iz Zdravstveno statističkih godišnjaka za period 2007-2016. godine. U analizi podataka korišćene su opšta stopa fertiliteta, stopa mortinataliteta, stopa rađanja, stopa mortaliteta odojčadi i stopa prevremenih porođaja, a trend stopa analiziran je korišćenjem jednačine linearnog trenda.

**Rezultati:** Prosečna stopa opšteg fertiliteta u Srbiji u periodu 2007-2016. godine je bila 1,5 deteta po ženi. U periodu 2007-2016. godine u Srbiji je registrovano 660.069 porođaja sa ukupno 671.715 rođene dece, od kojih je 4.054 mrtvorodeno (0,6%). Dve trećine (66,1%) mrtvorodene dece je bilo prevremeno rođeno. Sa starošću porodilja raste broj prevremenih porođaja. Od 667.661 živorođenih u porodilištima je umrlo 924 novorođenčadi (0,1%). U posmatranom periodu registruje se kontinuirani trend opadanja broja porođaja ( $y=68.427-439,99x$ ,  $R^2=0,628$ ), kao i broja živorođene dece ( $y=69.084-421,44x$ ,  $R^2=0,591$ ). Trend stopa mrtvorodjenih (mortinataliteta) pokazuje neznatno opadanje ( $y=6,138-0,012x$ ,  $R^2=0,016$ ), kao i trend stopa mortaliteta novorođenčadi ( $y=1,882-50,091x$ ,  $R^2=0,683$ ), ali dolazi do porasta trenda opšte stope fertiliteta ( $y=39,481+0,242x$ ,  $R^2=0,544$ ). Prosečna opšta stopa fertiliteta za desetogodišnji period iznosila je 41,1 živorođenih na 1000 žena fertilnog perioda i kretala se od 38,2‰ do 41,7‰. Najveće povećanje stope fertiliteta beleži se u starosnoj grupi 40-44 godine sa 3,8‰ u 2007. godini na 9,9‰ u 2016. godini (2,6 puta više), a zatim u starosnoj grupi 30-39 godina sa 43,2‰ u 2007. godini na 63,0‰ u 2016. godini (1,4 puta više). Beleži se pad stope fertiliteta u starosnoj dobi 20-29 godina sa 80,4‰ u 2007. godini na 72,2‰ u 2016. godini. Najveće stope mrtvorodjenosti (mortinataliteta) beleže se u najstarijoj grupi 45-49 godine (23,3‰), a najniža kod osoba mlađih od 15 godina (0,7‰).

**Zaključak:** Mere politike prema revitalizaciji rađanja moraju angažovati sve nivoe društva na izgradnji svesti i moralne odgovornosti prema fertilitetu.

**Ključne reči:** Deskriptivna studija, fertilitet, trend

**Uvod**

Prema definiciji Svetske zdravstvene organizacije (SZO), reproduktivno zdravlje predstavlja stanje fizičkog, mentalnog i socijalnog blagostanja u svim oblastima vezanim za reproduktivni sistem, u svim fazama života (1). To je složen koncept, koji obuhvata brojne aspekte pozitivnog zdravlja definisanog kao blagostanje u sferi seksualnih odnosa i planiranja porodice,

u oblasti zaštite od neželjenih trudnoća, seksualno prenosivih bolesti, neplodnosti, kao i sve resurse kojima se ovo blagostanje podupire (2). Planiranje porodice predstavlja svesnu aktivnost individue i parova u reproduktivnoj životnoj dobi, kojom teže da regulišu broj i vremenski raspored rađanja, kao i da rode zdravo dete (3,4).

## EPIDEMIOLOGICAL CHARACTERISTICS AND TRENDS OF BIRTH MOVEMENTS IN SERBIA

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### SUMMARY

**Introduction/Aim:** In recent decades, declines in fertility rates have been reported in almost every country in the world. The aim of the research is the analysis of epidemiological characteristics and childbirth trends in Serbia in the period 2007-2016.

**Methods:** The study was designed as a retrospective, descriptive, epidemiological study. The research data were collected from the Health Statistical Yearbooks of the Institute of Public Health of the Republic of Serbia "Dr Milan Jovanovic Batut" in the period 2007-2016. Total fertility rates, stillbirth rates, birth rates, infant mortality rates, and preterm birth rates were used for the analysis of data, while the linear trend and regression analysis were used to analyze the trend.

**Results:** Average rate of general fertility in Serbia in the period 2007-2016 was 1.5 children per woman. In the period 2007-2016, 660,069 births were registered in Serbia with a total of 671,715 children born, of which 4,054 were stillborn (0.6%). Two thirds (66.1%) of stillborn children were born prematurely. The number of premature births increased with maternal age. Of 667,661 live births in maternity hospitals, 924 newborns died (0.1%). In the observed period, a continuous trend of decreasing number of births was registered ( $y = 68,427 - 439.99x$ ,  $R^2 = 0.628$ ), as well as the number of live births ( $y = 69,084 - 421.44x$ ,  $R^2 = 0.591$ ). The trend of still birth rates showed a slight decrease ( $y = 6,138 - 0,012x$ ,  $R^2 = 0,016$ ), as well as the trend of infant mortality rates ( $y = 1,882 - 50,091x$ ,  $R^2 = 0,683$ ), but there came to an increase in the trend of the general fertility rate ( $y = 39.481 + 0.242x$ ,  $R^2 = 0.544$ ). The average general fertility rate for the ten-year period was 41.1 live births per 1000 women of the fertile period and ranged from 38.2‰ to 41.7‰. The largest increase in the fertility rate was registered in the age group 40-44 years from 3.8‰ in 2007 to 9.9‰ in 2016 (2.6 times more), and then in the age group 30-39 years with 43.2‰ in 2007 to 63.0 ‰ in 2016 (1.4 times more). There came to a decline in the fertility rate at the age of 20-29 from 80.4‰ in 2007 to 72.2 ‰ in 2016. The highest rates of stillbirth were registered in the oldest group of 45-49 years (23.3 ‰), and the lowest in persons younger than 15 years (0.7‰).

**Conclusion:** Birth revitalization policies must engage all levels of society to build awareness and moral responsibility for fertility.

**Keywords:** Descriptive study, fertility, trend

### Introduction

According to the definition of the World Health Organization (WHO), reproductive health is a state of physical, mental, and social well-being in all matters relating to the reproductive system, at all stages of life (1). It is a complex concept, which includes numerous aspects of positive health, which is defined as

the well-being in all spheres of life, including sexual relations, family planning, contraception, sexually transmitted infections, infertility, as well as all resources that support this well-being (2). Family planning is a conscious activity of individuals and couples in the reproductive life stage, which allows them to attain their desired number of children and to determine the time of

Fertilitet je najdinamičniji i najintrigantniji demografski fenomen, koji predstavlja učestalost rađanja žena starosti 15 do 49 godina (5). U poslednjih nekoliko decenija pad stope fertiliteta je zabeležen u gotovo svim državama sveta. Prema poslednjem izveštaju Populacionog odeljenja pri Ujedinjenim nacijama za period 2010-2015. godine, procenjeno je da više od 50% svetske populacije živi u državama sa niskim nivoom fertiliteta, gde žene rađaju u proseku manje od 2,1 deteta tokom reproduktivnog perioda. To uključuje sve evropske države i Severnu Ameriku, dvadeset država u Aziji, sedamnaest u Latinskoj Americi i na Karibima, tri u Okeaniji i jednu u Africi. Najniža stopa fertiliteta zabeležena je 2015. godine u Kini (1,2) gde je usledilo ukidanje „politike rađanja jednog deteta“. U 2016. godini u 103 države stopa fertiliteta je bila ispod nivoa potrebnog za prostu reprodukciju stanovništva, od čega je u trideset dve države bila ispod 1,5 deteta po ženi (3).

Cilj istraživanja je bio da se analiziraju epidemiološke karakteristike i trend kretanja porođaja u Srbiji u periodu 2007-2016. godine.

## Metode

Istraživanje je dizajnirano kao deskriptivna epidemiološka studija. Podaci su preuzeti iz Zdravstveno statističkih godišnjaka Instituta za javno zdravlje Republike Srbije „Dr Milan Jovanović Batut“ za period 2007-2016. godine. Analiziran je uzorak od 660.069 porođaja sa ukupno 671.715 rođene dece. Izvor ovih podataka je prijava rođenja. Na osnovu Zakona o zdravstvenoj dokumentaciji i evidencijama u oblasti zdravstva, zdravstvene ustanove, kao i sva druga pravna i fizička lica koja obavljaju zdravstvenu delatnost dužni su da vode medicinsku dokumentaciju i evidencije i da dostavljaju individualne, zbirne i periodične izveštaje nadležnom Institutu/Zavodu za javno zdravlje. Prijava rođenja služi za dokazivanje činjenice rođenja radi upisa u matičnu knjigu rođenih. Prijavu rođenja popunjava zdravstvena ustanova koja je po zakonu dužna da prijavi rođenje. U slučaju rođenja van zdravstvene ustanove prijavu rođenja popunjava lekar ili babica koji su sudelovali u porođaju. Prijava rođenja se popunjava u tri primerka, jedan zadržava zdravstvena ustanova, drugi se dosta-

vlja matičnoj službi, a treći nadležnom Institutu/Zavodu za javno zdravlje.

U okviru ovog rada analizirani su sledeći podaci: broj porođaja, broj ukupno rođenih (živorođeni, mrtvorodođeni), starost majke na rođenju deteta, ishod trudnoće, telesna masa na rođenju, komplikacije trudnoće i patološka stanja novorođene dece.

Za prikazivanje podataka korišćene su deskriptivne metode: tabeliranje i grafičko prikazivanje. U statističkoj obradi podataka korišćene su proporcije, opšte i uzrasno-specifične stope (opšta stopa fertiliteta, stopa mrtvorodođenosti - mortinatalitet, stopa mortaliteta novorođenčadi, stopa rađanja, stopa prevremenih porođaja). Linearni trend i regresiona analiza korišćeni su za analizu trenda.

Opšta stopa fertiliteta je izračunata kao broj živorođene dece na 1000 žena fertalnog perioda (od 15-49 godine života). Stopa mrtvorodođenja ili mortinataliteta je izračunata kao broj mrtvorodođenih na 1000 živorođenih. Stopa rađanja se izračunava kao broj živorođenih na 1000 žena. Stopa mortaliteta novorođenčadi izračunava se kao broj umrle novorođenčadi na 1000 živorođenih. Stopa preveremenih porođaja je izračunata kao broj prevremenih porođaja na 100 živorođene dece.

## Rezultati

U posmatranom periodu 2007-2016. godine u Srbiji je na osnovu prijava rođenja registrovano 660.069 porođaja sa ukupno 671.715 rođene dece, od kojih je 4.054 mrtvorodođeno (0,6%). Od 667.661 živorođenih u porodilištima je umrlo 924 novorođenčadi (0,1%) (Tabela 1).

Najveći broj novorođenih je od strane majki uzrasta 20-29 godina (347,611; 51,7%) i uzrasta 30-39 godina (275,031; 40,9%), a najmanji uzrasta 50 i više godina (91; 0,01%). U starosnoj grupi ispod 15 godina registrovano je 450 novorođenih (0,06%). Najmanji broj mrtvorodođenih prijavljen je kod majki mlađih od 15 godina (3), a najviše kod majki uzrasta 20 do 29 godina (1847).

U posmatranom periodu registruje se kontinuirani trend opadanja broja porođaja ( $y=68.427-439,99x$ ,  $R^2=0,628$ ), kao i broja živorođene dece ( $y=69.084-421,44x$ ,  $R^2=0,591$ ) (Grafikon 1). U 2016. godini, u odnosu na 2007. godinu, apsolutni broj porođaja je opao za

pregnancies, as well as to give birth to a healthy child (3,4).

Fertility is the most dynamic and most intriguing demographic phenomenon, which relates to the frequency of childbirth among women aged 15 to 49 years (5). In recent decades, a decline in fertility rates has been reported in almost every country in the world. According to the last report of the Population Division of the Department of the United Nations Secretariat for the period 2010-2015, it was estimated that more than 50% of the world population lived in countries with low levels of fertility, where fertility was below 2.1 births per woman during the reproductive period. It included all European countries and North America, twenty countries in Asia, seventeen in Latin America and the Caribbean, three in Oceania, and one in Africa. The lowest fertility rate was reported in China, in 2015 (1,2), where the abolition of the "one-child policy" followed. In 2016, in 103 countries, the fertility rate was below the level necessary for the simple reproduction of the population, while in thirty-two countries it was below 1.5 births per woman (3).

The aim of the research was to analyze the epidemiological characteristics and childbirth trends in Serbia in the period 2007-2016.

## Methods

The research was designed as a descriptive epidemiological study. Data were taken from the Health Statistical Yearbooks of the Institute of Public Health of Serbia "Dr Milan Jovanovic Batut" for the period 2007-2016. The sample of 660.069 births was analyzed with a total of 671.715 children born. The source of these data was the Notification of birth. According to the Law on medical documentation and records in the field of health care, health care institutions, as well as other legal entities and natural persons, providers of health care services, are obliged to keep medical records and to submit individual, collective, periodical reports to the authorized Public Health Institute. The Notification of birth serves as the evidence of birth so that birth certificates can be obtained. The birth notification form is completed by the health care institutions, which are obliged to register the birth. When birth occurs outside healthcare facilities, the birth notification form is

completed by a doctor or a midwife, who helped a woman during labor. The birth notification form is completed in three copies. One is kept by the healthcare institution, the second is sent to the registered office, while the third is sent to the authorized Public Health Institute.

In this study, the following data were analyzed: the number of births, the total number of children born (live births, stillbirths), age of mother at birth, the outcome of pregnancy, body weight at birth, complications of pregnancy, and pathological states of children born.

Descriptive methods were used to present data: tables and graphs. Proportions, general and age-specific rates were used in the statistical analysis of data (general fertility rate, stillbirth rates, infant mortality rate, birth rates, preterm birth rate). The linear trend and regression analysis were used for the trend analysis.

The total fertility rate was calculated as the number of live births per 1000 women in the reproductive period (aged 15-49). The stillbirth rate was calculated as the number of stillbirths per 1000 births. The birth rate was calculated as the number of live births per 1000 women. The infant mortality rate was calculated as the number of infant deaths per 1000 live births. The preterm birth rate was calculated as the number of preterm deliveries per 1000 live births.

## Results

In the observed period from 2007 to 2016, in Serbia, there were 660.069 births registered with a total of 671.715 live births and 4.054 stillbirths (0.6%). Of 667.661 live births, 924 newborns died in maternity hospitals (0.1%) (Table 1).

The greatest number of live births was among mothers aged 20-29 (347.611; 51.7%) and among mothers aged 30-39 (275.031; 40.9%), while the smallest number was in the age group 50 and older (91; 0.01%). In the age group younger than 15, 450 newborn babies were registered (0.06%). The smallest number of stillbirths was reported in mothers younger than 15 (3), while the largest number was in mothers aged 20-29 years (1847).

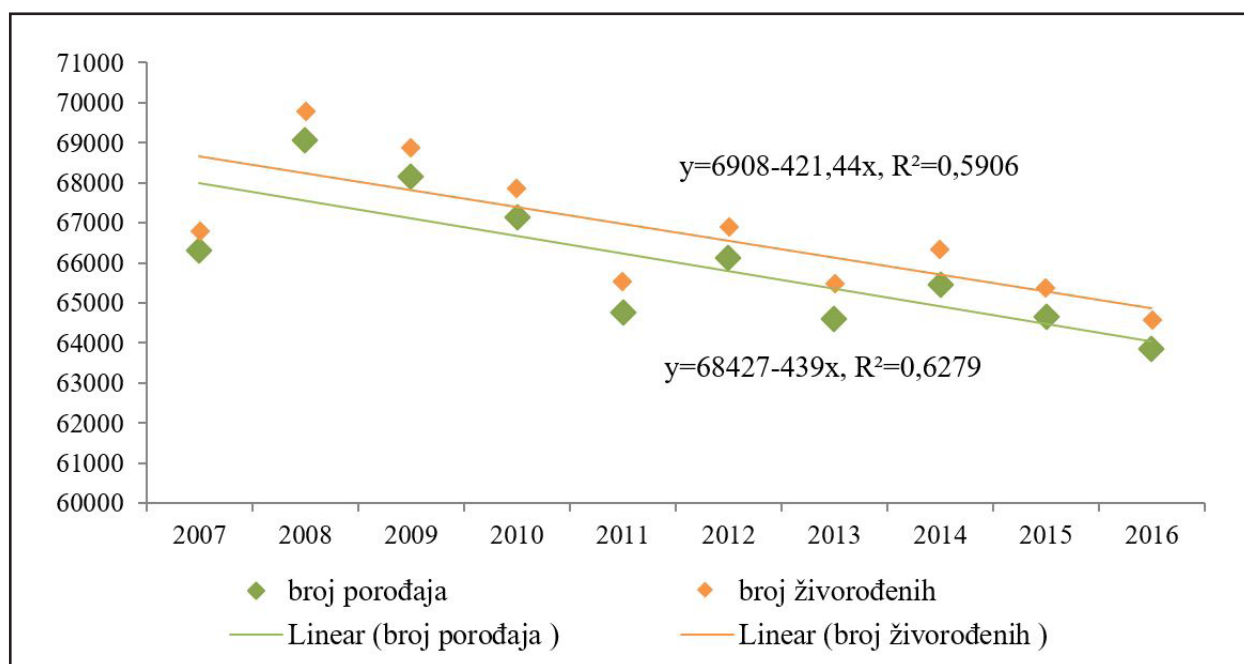
In the observed time period, the continuous trend of decrease in the number of births was registered ( $y=68,427-439.99x$ ,  $R^2=0.628$ ), as

Tabela 1. Broj novorođene dece prema starosti majke pri porođaju, Srbija, 2007-2016. godina

Starost majke	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Ukupno	%
<b>Republika Srbija</b>	67245	70201	69316	68312	65945	67330	65865	66711	65806	64984	671715	100.0
Živorodeno	66826	69785	68896	67876	65558	66914	65502	66332	65385	64587	667661	99.4
Mrtvorodeno	419	416	420	436	387	416	363	379	421	397	4054	0.6
<b>&lt;15</b>	93	46	66	47	37	34	24	32	25	26	430	100.0
Živorodeno	92	45	66	47	37	34	24	31	25	26	427	99.3
Mrtvorodeno	1	1	0	0	0	0	0	1	0	0	3	0.7
<b>15-19</b>	4854	3761	3582	3359	3032	2910	2678	2642	2268	2169	31255	100.0
Živorodeno	4823	3726	3551	3229	3013	2888	2656	2622	2244	2142	30894	98.8
Mrtvorodeno	31	35	31	30	19	22	22	20	24	27	261	0.8
<b>20-29</b>	40043	40080	37646	36342	34058	34037	32551	32092	30726	30036	347611	100.0
Živorodeno	39812	39885	37454	36138	33878	33843	32383	31930	30558	29883	345764	99.5
Mrtvorodeno	231	195	192	204	180	194	168	162	168	153	1847	0.5
<b>30-39</b>	21276	24960	26574	26974	27184	28559	28754	29854	30503	30393	275031	100.0
Živorodeno	21141	24797	26399	26794	27022	28374	28600	29679	30308	30207	273321	99.4
Mrtvorodeno	135	163	175	180	162	185	154	175	195	186	1710	0.6
<b>40-44</b>	920	1261	1373	1472	1524	1664	1705	1928	2157	2233	16237	100.0
Živorodeno	902	1241	1353	1453	1502	1650	1689	1908	2125	2205	16028	98.7
Mrtvorodeno	18	20	20	19	22	14	16	20	32	28	209	1.3
<b>45-49</b>	53	87	69	110	103	119	139	144	120	112	1056	100.0
Živorodeno	50	85	67	107	99	118	136	143	118	109	1032	97.7
Mrtvorodeno	3	2	2	3	4	1	3	1	2	3	24	2.3
<b>50+</b>	2	6	6	8	7	7	14	19	7	15	91	100.0
Živorodeno	2	6	6	8	7	7	14	19	7	15	91	100.0
Mrtvorodeno	0	0	0	0	0	0	0	0	0	0	0	0

**Table 1.** Number of newborns by age of mother at birth, Serbia, 2007-2016

Mother's age	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Ukupno	%
<b>Republic of Serbia</b>												
Total	67245	70201	69316	68312	65945	67330	65865	66711	65806	64984	671715	100.0
Live birth	66826	69785	68896	67876	65558	66914	65502	66332	65385	64587	667661	99.4
Stillbirth	419	416	420	436	387	416	363	379	421	397	4054	0.6
<b>&lt;15</b>												
Total	93	46	66	47	37	34	24	32	25	26	430	100.0
Live birth	92	45	66	47	37	34	24	31	25	26	427	99.3
Stillbirth	1	1	0	0	0	0	0	1	0	0	3	0.7
<b>15-19</b>												
Total	4854	3761	3582	3359	3032	2910	2678	2642	2268	2169	31255	100.0
Live birth	4823	3726	3551	3229	3013	2888	2656	2622	2244	2142	30894	98.8
Stillbirth	31	35	31	30	19	22	22	20	24	27	261	0.8
<b>20-29</b>												
Total	40043	40080	37646	36342	34058	34037	32551	32092	30726	30036	347611	100.0
Live birth	39812	39885	37454	36138	33878	33843	32383	31930	30558	29883	345764	99.5
Stillbirth	231	195	192	204	180	194	168	162	168	153	1847	0.5
<b>30-39</b>												
Total	21276	24960	26574	26974	27184	28559	28754	29854	30503	30393	275031	100.0
Live birth	21141	24797	26399	26794	27022	28374	28600	29679	30308	30207	273321	99.4
Stillbirth	135	163	175	180	162	185	154	175	195	186	1710	0.6
<b>40-44</b>												
Total	920	1261	1373	1472	1524	1664	1705	1928	2157	2233	16237	100.0
Live birth	902	1241	1353	1453	1502	1650	1689	1908	2125	2205	16028	98.7
Stillbirth	18	20	20	19	22	14	16	20	32	28	209	1.3
<b>45-49</b>												
Total	53	87	69	110	103	119	139	144	120	112	1056	100.0
Live birth	50	85	67	107	99	118	136	143	118	109	1032	97.7
Stillbirth	3	2	2	3	4	1	3	1	2	3	24	2.3
<b>50+</b>												
Total	2	6	6	8	7	7	14	19	7	15	91	100.0
Live birth	2	6	6	8	7	7	14	19	7	15	91	100.0
Stillbirth	0	0	0	0	0	0	0	0	0	0	0	0



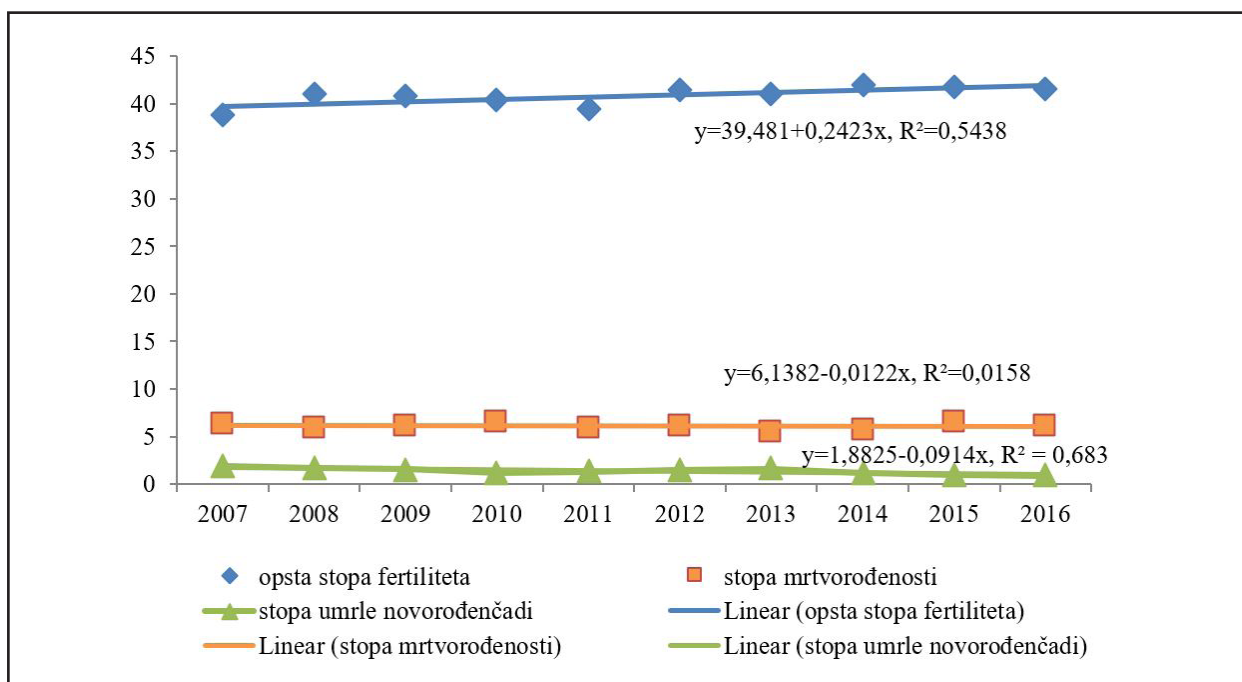
Grafikon 1. Trend broja porođaja i živorođenih u Srbiji, 2007-2016. godina

2462 porođaja, a broj živorođene dece za 2239. Najveći broj porođaja beleži se u 2008. godini (69.035 porođaja), a najmanji u 2016. godini (63.855 porođaja).

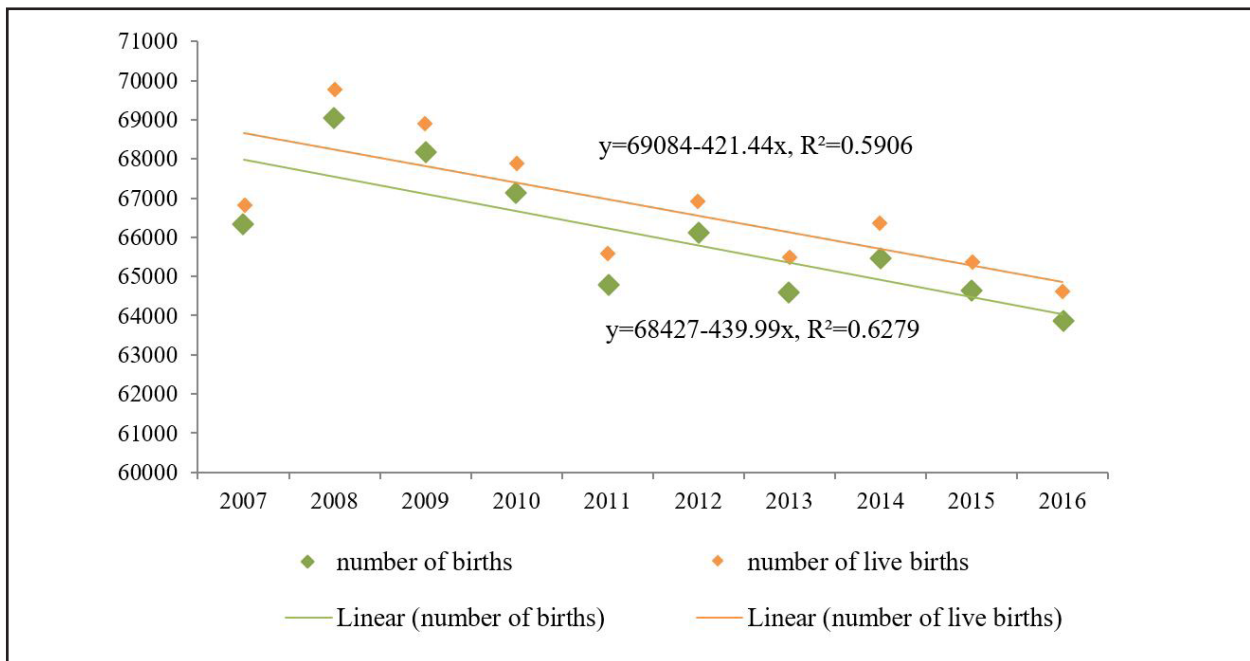
Trend stopa mrtvorodenih (mortinataliteta) pokazuje opadanje sa 6,3‰ u 2007. na 6,1‰ u 2016. godini ( $y=6,138-0,012x$ ,  $R^2=0,016$ ) (Grafikon 2). U Srbiji, prosečna stopa mrtvorodenih je iznosila 6,1‰ za period od 2007. do 2016. godine. Takođe se beleži značajan trend opadanja stope mortaliteta novorođenčadi

( $y=1,882-0,091x$ ,  $R^2=0,683$ ). Prosečna stopa mortaliteta novorođenčadi je iznosila 1,4‰ za period od 2007. do 2016. godine.

U Srbiji je prosečan broj živorođene dece, u posmatranom periodu, iznosio 1,5 deteta po ženi. Prosečna opšta stopa fertiliteta za deseto-godišnji period iznosila je 40,8 živorođenih na 1000 žena fertilnog perioda i kretala se od 38,2‰ do 41,7‰. Takođe, u istom periodu dolazi do neznatnog trenda porasta opšte stope fertiliteta ( $y=39,481+0,242x$ ,  $R^2=0,544$ ).



Grafikon 2. Trend opšte stope fertiliteta (‰), stope mrtvorodenja (mortinataliteta) (‰) i stope smrtnosti novorođenčadi (‰) u Srbiji za period 2007-2016. godine



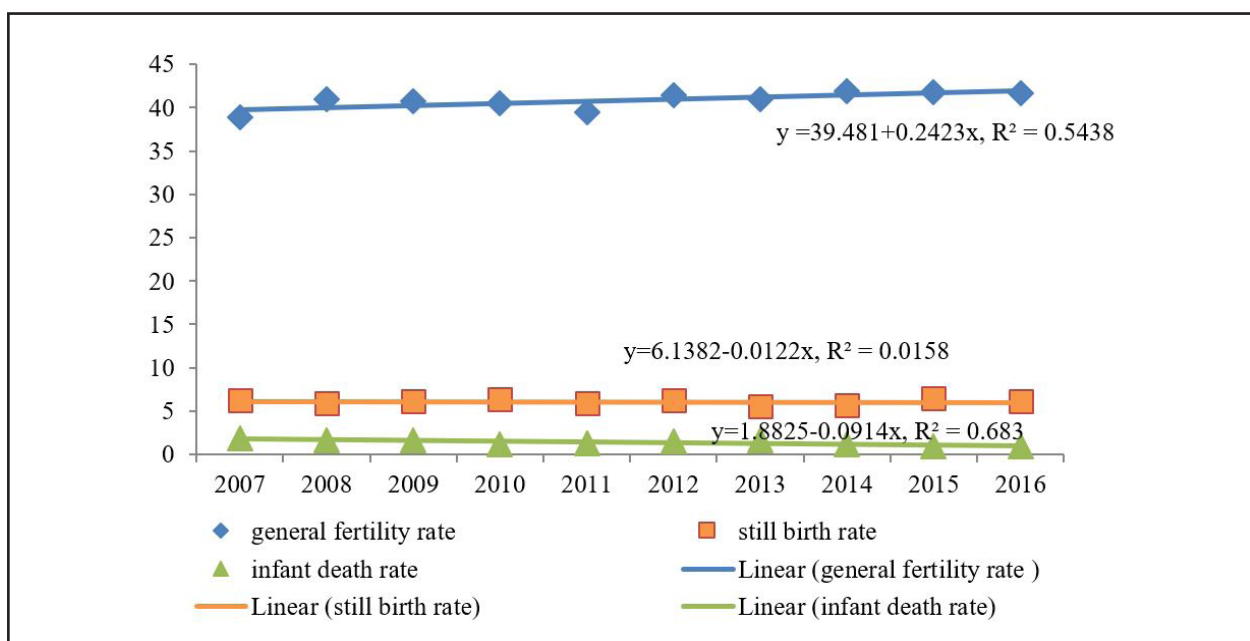
**Figure 1.** Trend in the number of births and live births in Serbia, for the period 2007-2016

well as in the number of live births ( $y=69,084-421,44x$ ,  $R^2=0.591$ ) (Figure 1). In 2016, in comparison to 2017, the absolute number of births decreased by 2462 births, while the number of live births was 2239. The largest number of births was recorded in 2008 (69,035 births), while the smallest was in 2016 (63,855).

The trend in stillbirth rates showed a decrease from 6.3‰ in 2017 to 6.1‰ in 2016 ( $y=6.138-0.012x$ ,  $R^2=0.016$ ) (Figure 2). In Serbia, the average rate of stillbirths amounted to 6.1‰ for the period 2007 to 2016. Also, a significant

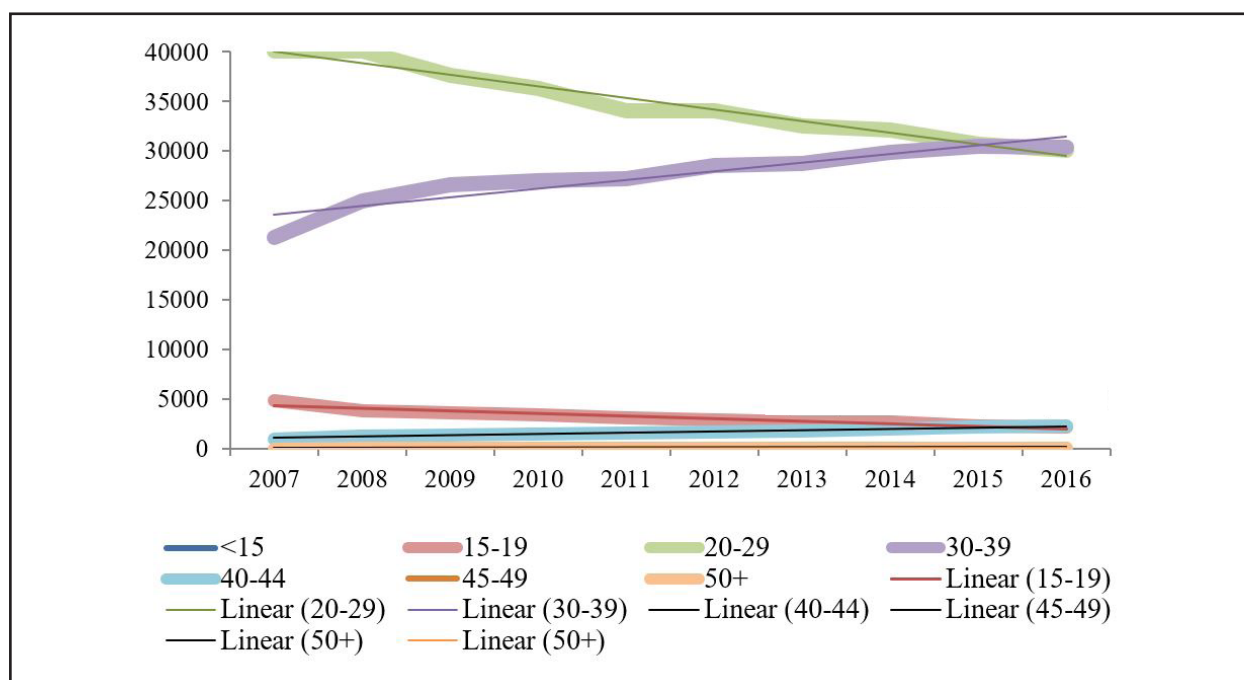
declining infant mortality rate was recorded ( $y=1.882-0.091x$ ,  $R^2=0.683$ ). In Serbia, the average infant mortality rate amounted to 1.4‰ for the period 2007-2016.

In Serbia, the average number of live births in the observed time period amounted to 1.5 children per one woman. The average general fertility rate for the ten-year period amounted to 40.8‰ and it ranged from 38.2‰ to 41.7‰. Also, in the same time period the trend in general fertility rate slightly increased ( $y=39.481+0.242x$ ,  $R^2=0.544$ ).



**Figure 2.** Trend in general fertility rate (‰), still birth rate (‰) and infant mortality rate (‰) in Serbia in the period 2007-2016





**Grafikon 3.** Trend broja porođaja u odnosu na starost majke pri porođaju u Srbiji, 2007-2016. godine

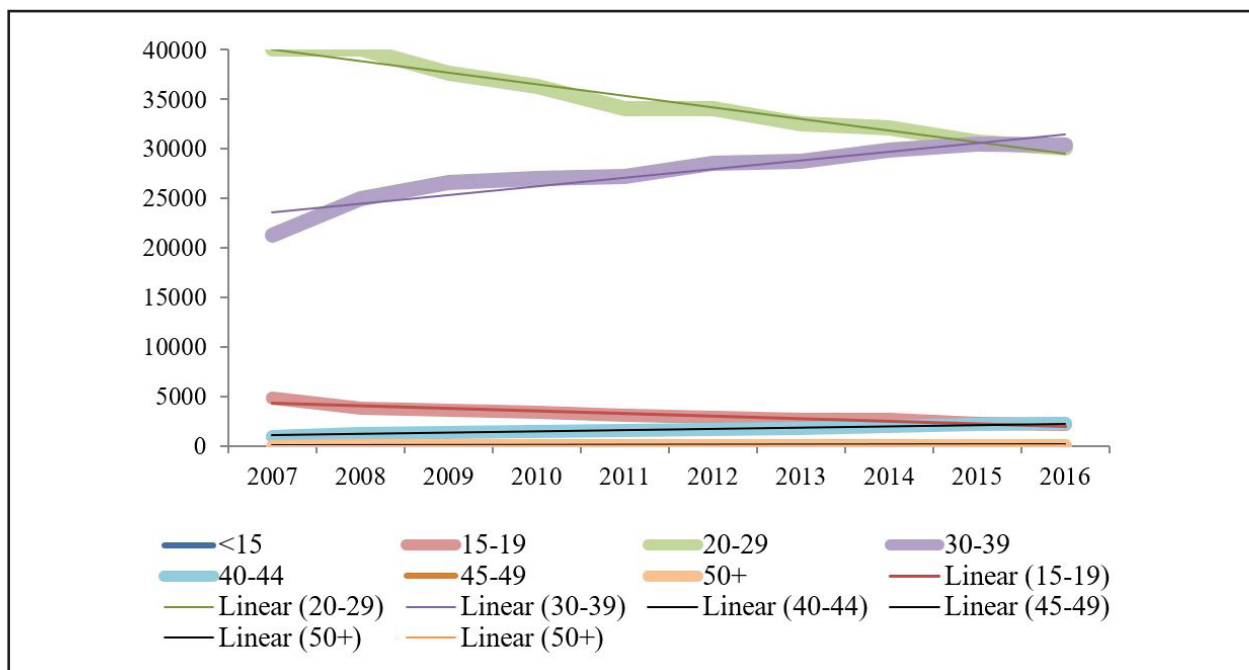
U Srbiji, u periodu 2007-2016. godine beleži se trend porasta broja porođaja u uzrasnoj grupi 30-39 godina ( $y=22.704+872,54x$ ;  $R^2=0,872$ ), 40-44 godine ( $y=900,27+131,53x$ ,  $R^2=0,965$ ) 45-49 godina ( $y=64,267+7,515x$ ,  $R^2=0,622$ ), 50 i više godina ( $y=2,2+1,254x$ ,  $R^2=0,539$ ), dok se pad broja porođaja beleži u dobnoj grupi ispod 15 godina ( $y=75,4-5,945x$ ,  $R^2=0,965$ ), 15-19 godina ( $y=4508,2-251,4x$ ,  $R^2=0,900$ ) i u uzrasnoj grupi 20-29 godina ( $y=41.251-1180x$ ,  $R^2=0,968$ ) (Grafikon 3).

U periodu od 2007. do 2016. godine dolazi do porasta stope fertiliteta sa 39,1 na 41,9‰ (Tabela 2). Najveće povećanje stope fertiliteta beleži se u starosnoj grupi 40-44 godine sa 3,8‰ u 2007. godini na 9,9‰ u 2016. godini (2,6 puta više), a zatim u starosnoj grupi 30-39 godina sa 43,2‰ u 2007. godini na 63,0‰ u 2016. godini (1,4 puta više). Beleži se pad stope fertiliteta u starosnoj dobi 20-29 godina sa 80,4‰ u 2007. godini na 72,2‰ u 2016. godini, 15-19 godina sa 22,3‰ žena u 2007. godini na 12,6‰ u 2016. godini i kod osoba mlađih od 15 godina, sa 0,17‰ na 0,05‰. Prosečna stopa fertiliteta za posmatrani period iznosila je 41,1‰, pri čemu je ova stopa bila najviša u starosnoj grupi 20-29 godina (75,3‰) i 30-39 godina (55,8‰), a najmanja u uzrastu 15-19 godina (15,8‰), 40-44 godina (6,8‰) i 45-49 godina (0,4‰).

Najveće stope mrtvorodenosti (mortaliteta) beleže se u najstarijoj grupi 45-49 godine (23,3‰), a zatim u starosnoj grupi 40-44 (13,0‰). Najniže su kod osoba mlađih od 15 godina (0,7‰) i u uzrastu 20-29 godina (5,3‰) (Tabela 3).

Posmatrano prema ishodu trudnoće, od 671.715 rođene dece najviše porođaja 622.647 (92,6%) bilo je u terminu, a najmanje prevremenih (47.358 tj. 7,1%) i posle termina (158 tj. 0,02%) (Tabela 4). Dve trećine (66,1%) mrtvorodene dece je bilo prevremeno rođeno. U Srbiji se zapaža kontinuirani trend porasta stope prevremenih porođaja ( $y=0,206x+5,520$ ;  $R^2=0,916$ ). Prosečna stopa prevremenih porođaja na 100 živorođenih je 6,6 za posmatrani period, a kretala se od 5,5 do 7,3 na 100 živorođenih.

Sa starošću porodilja raste broj prevremenih porođaja pa se najveća stopa prevremenih porođaja beleži u najstarijoj dobnoj grupi 45-49 godina (24 prevremenih porođaja na 100 živorođenih), 40-44 godina (11,4 prevremenih porođaja na 100 živorođenih), a najmanje 20-29 godina (5,6 prevremenih porođaja na 100 živorođenih), 30-39 godina (7,4 prevremenih porođaja na 100 živorođenih), 15-19 godina (7,6 prevremenih porođaja na 100 živorođenih), i među mlađima od 15 godina (8,6 prevremenih porođaja na 100 živorođenih).



**Figure 3.** Trend in the number of births in relation to the age of mothers at the birth of a child, Serbia, 2007-2016

In Serbia, in the period 2007-2016, the increasing trend in the number of births increased in the age group 30-39 years ( $y=22.704+872.54x$ ;  $R^2=0.872$ ), 40-44 years ( $y=900.27+131.5x$ ,  $R^2=0.965$ ), 45-49 years ( $y=64.267+7.5152x$ ,  $R^2=0.622$ ), 50 years and older ( $y=2.2+1.2545x$ ,  $R^2=0.539$ ), whereas a decrease in the number of births was recorded in the age group younger than 15 ( $y=75.4-5.945x$ ,  $R^2=0.965$ ), 15-19 years ( $y=4508.2-251.4x$ ,  $R^2=0.900$ ) and in the age group 20-29 years ( $y=41.251-1180x$ ,  $R^2=0.968$ ) (Figure 3).

In the period 2007 to 2016, there came an increase in the fertility rate from 39.1‰ to 41.9‰ (Table 2). The greatest increase in the fertility rate was recorded in the age group 40-44 years from 3.8‰ in 2007 to 9.9‰ in 2016 (2.6 times more), and then in the age group 30-39 from 43.2‰ in 2007 to 63.0‰ in 2016 (1.4 times more). A decrease in the fertility rate was noted in the age group 20 to 29 years from 80.4‰ in 2007 to 72.2‰ in 2016, 15-19 years from 22.3‰ women in 2007 to 12.6‰ in 2016, as well as in women younger than 15, from 0.17‰ to 0.05‰. The average fertility rate for the observed time period amounted to 41.1 live births per 1000 women in the fertile period, while this rate was the highest in the age group 20-29 years (75.3‰) and 30-39 years (55.8‰), and the lowest in the age group 15 to

19 years (15.8‰), 40-44 years (6.8‰) and 45-49 years (0.4‰).

The largest stillbirth rates were recorded in the oldest group 45-49 years (23.3‰), and then in the age group 40-44 years (13.0‰). The lowest rates were in persons younger than 15 years (0.7‰) and in the age group 20-29 years (5.3‰) (Table 3).

As far as the outcome of pregnancy is concerned, of 671.715 children born, most deliveries were in term (622.647, that is, 92.6%), while 47.358 (7.1%) were preterm and 158 (0.02%) were after the term (Table 4). Two-thirds of stillborn children (66.1%) were born prematurely. In Serbia, the continuous increasing trend of preterm birth rates was noticed ( $y=5.520+0.206x$ ;  $R^2=0.916$ ). The average preterm birth rate per 100 live births was 6.6 for the observed time period, and it ranged from 5.5 to 7.3 per 100 live births.

The preterm birth rate increased with maternal age, and therefore, the largest rate of preterm deliveries was noted in the oldest age group 45-49 years (24 preterm births per 100 live births), 40-44 years (11.4 preterm births per 100 live births), while the lowest rate was in the age group 20-29 (5.6 preterm births per 100 live births), 30-39 years (7.4 preterm births per 100 live births), 15-19 years (7.6 preterm births per 100 live births), and in the age group

**Tabela 2.** Specifične stope fertiliteta (‰), Srbija, 2007-2016.

Starost majke	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2007-2016
<15	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
15-19	22.3	17.7	17.2	16.3	14.9	15.0	14.2	14.5	12.9	12.6	15.8
20-29	80.4	81.3	77.4	73.1	72.2	75.7	73.8	74.3	72.5	72.2	75.3
30-39	43.2	50.4	53.4	53.9	54.0	58.0	58.6	60.9	62.5	63.0	55.8
40-44	3.8	5.2	5.7	6.1	6.4	7.1	7.2	8.1	8.9	9.9	6.8
45-49	0.2	0.3	0.3	0.4	0.4	0.5	0.6	0.6	0.5	0.5	0.4
0-49	39.1	41.2	41.0	40.7	39.7	41.6	41.2	42.2	42.0	41.9	41.1

### Diskusija

Rezultati ovog istraživanja su pokazali da se u Srbiji beleži kontinuirani trend opadanja broja porođaja i živorođene dece. Prosečan broj živorođene dece u Srbiji je 1,5 dece po ženi, što je za trećinu manje od nivoa potrebnog za prostu reprodukciju koji predviđa 2,1 živorođenje (6).

Fenomen nedovoljnog rađanja dece je duboko uslovljen proces koji nije uspelo da izbegne nijedno razvijeno društvo. Nedovoljno rađanje dece nije realnost samo u razvijenim zemljama niti isključivo zapadne civilizacije, budući da se, prema proceni Ujedinjenih nacija, sa ovim fenomenom danas suočava više od 50% svetske populacije uključujući ceo evropski kontinent, ali i neke od najmnogoljudnijih zemalja – Kinu, SAD, Brazil, Rusiju, Japan, Vijetnam, Nemačku, Iran, Tajland i Veliku Britaniju. Pritom su neke od ovih država sve do nedavno bile sinonim veoma visokog fertiliteta (7,8). Prosečan broj živorođene dece po ženi na globalnom nivou je u periodu od 1950. do 2009. godine prepolovljen sa 5 na 2,5. U 2015. godini, nivo fertiliteta je na

nivou proste reprodukcije i predviđa se da će se pad nastaviti i tokom narednih godina do 2050. godine, mada smanjenom brzinom. U Africi je fertilitet još uvek veoma visok (4,4) (9).

Od visokofertilitetnog područja, Srbija je postala niskofertilitetna, i to mnogo brže nego druge evropske zemlje, mada unutar nje još uvek postoje regionalne diferencijacije plodnosti (10). Od 1950, kada su žene u proseku rađale 3,1 dete, do 2011. broj dece je redukovao na 1,4, što je odličan pokazatelj promena u reproduktivnim normama i ponašanju stanovništva Srbije, ali i teške društveno-ekonomske situacije (11). Prema poslednje dostupnim podacima, koji se odnose na 2016. godinu, prosečan broj živorođene dece po ženi u Republici Srbiji iznosi 1,46, što je ispod evropskog proseka, koji iznosi 1,58 deteta po ženi (12). Drugim rečima, nivo rađanja je u kontinuitetu od 1999. čak za 30% niži od nivoa potrebnog za prostu reprodukciju stanovništva, kada se Republika Srbija posmatra kao celina, što znači da će generacije žena koje budu rađale u periodu 2017-2034. godine biti

**Tabela 3.** Specifične stope mrtvorodenosti (‰), Srbija, 2007-2016. godine

Starost majke	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2007-2016
<15	1.1	2.2	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.7
15-19	6.4	9.4	8.7	9.3	6.3	7.6	8.3	7.6	10.7	12.6	8.4
20-29	5.8	4.9	5.1	5.6	5.3	5.7	5.2	5.1	5.5	5.1	5.3
30-39	6.4	6.6	6.6	6.7	6.0	6.5	5.4	5.9	6.4	6.2	6.3
40-44	20.0	16.1	14.8	13.1	14.6	8.5	9.5	10.5	15.1	12.7	13.0
45-49	60.0	23.5	29.9	28.0	40.4	8.5	22.1	7.0	16.9	27.5	23.3
0-49	60.0	23.5	29.9	28.0	40.4	8.5	22.1	7.0	16.9	27.5	23.3

**Table 2.** Specific birth rates (‰), Serbia, 2007-2016.

Starost majke	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2007-2016
<15	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
15-19	22.3	17.7	17.2	16.3	14.9	15.0	14.2	14.5	12.9	12.6	15.8
20-29	80.4	81.3	77.4	73.1	72.2	75.7	73.8	74.3	72.5	72.2	75.3
30-39	43.2	50.4	53.4	53.9	54.0	58.0	58.6	60.9	62.5	63.0	55.8
40-44	3.8	5.2	5.7	6.1	6.4	7.1	7.2	8.1	8.9	9.9	6.8
45-49	0.2	0.3	0.3	0.4	0.4	0.5	0.6	0.6	0.5	0.5	0.4
0-49	39.1	41.2	41.0	40.7	39.7	41.6	41.2	42.2	42.0	41.9	41.1

younger than 15 (8.6 preterm births per 100 live births).

### Discussion

The results of this research showed a continuous declining trend in the number of births and live births. The average number of live births in Serbia was 1.5 children per one woman, which is for one third less than the level necessary for simple reproduction which predicts 2.1 live births (6).

The phenomenon of an insufficient number of births is a deeply conditional process, which could not be avoided in developed countries. The insufficient number of births is not reality only in developed countries and solely in the Western civilization because, according to the estimates of the United Nations, more than 50% of the world population is faced with this phenomenon, including the whole European continent, as well as some of the countries with largest population numbers – China, USA, Brazil, Russia, Japan, Vietnam, Germany, Iran, Thailand,

and Great Britain. Some of these countries have been the synonym of high fertility until recently (7,8). The average number of live births per woman at the global level decreased twofold from 5 to 2.5 between 1950 and 2009. In 2015, the level of fertility was at the level of simple reproduction and the estimates were made that it would continue to fall in the following years, until 2050, although at a slower pace. In Africa, fertility is still very high (4,4) (9).

Serbia had been a region with high fertility rates, however, it became a country with low fertility rates much faster than other European countries, although there are some regional differences regarding fertility (10). Since 1950, when women gave birth to 3.1 children on average, the number of children was reduced to 1.4 in 2011, which is an excellent sign of changes in relation to reproductive norms and ways of behaving in Serbia, as well as difficult socio-economic situation (11). According to the last available data, which relate to the year 2016, the average number of live births in Serbia per

**Table 3.** Specific still birth rates (‰), Serbia, 2007-2016.

Mother's age	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2007-2016
<15	1.1	2.2	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.7
15-19	6.4	9.4	8.7	9.3	6.3	7.6	8.3	7.6	10.7	12.6	8.4
20-29	5.8	4.9	5.1	5.6	5.3	5.7	5.2	5.1	5.5	5.1	5.3
30-39	6.4	6.6	6.6	6.7	6.0	6.5	5.4	5.9	6.4	6.2	6.3
40-44	20.0	16.1	14.8	13.1	14.6	8.5	9.5	10.5	15.1	12.7	13.0
45-49	60.0	23.5	29.9	28.0	40.4	8.5	22.1	7.0	16.9	27.5	23.3
0-49	60.0	23.5	29.9	28.0	40.4	8.5	22.1	7.0	16.9	27.5	23.3

**Tabela 4.** Rođena deca prema terminu porođaja, Srbija, 2007-2016. godine

Novorođeni	Termin porođaja			Ukupno Broj (%)
	Prevremeni Broj (%)	U terminu Broj (%)	Posle termina Broj (%)	
<b>Ukupno rođeni</b>	47,358 (7.1)	622,647 (92.7)	158 (0.02)	671,715 (100)
<b>Živorodeni</b>	41,677 (6.2)	621,341 (99.8)	156 (0.02)	667,661 (100)
<b>Mrtvorodeni</b>	2,681 (66.1)	1,306 (32.3)	2 (0.05)	4,054 (100)

gotovo za trećinu manje u odnosu na generacije koje su rađale u periodu 1999-2016. godine (12).

Promenu obrazaca u reproduktivnom ponašanju usmerenih ka prihvatanju niskih reproduktivnih normi uslovljava veći broj činilaca različite vrste: društveni, ekonomski, politički, demografski, kulturno-psihološki faktori, kao i grupa socijalnih i individualnih normi nastalih u sferi promenjenih uslova života, a manifestovanih kroz odlaganje rađanja u optimalnoj životnoj dobi i sve nižu stopu ukupnog fertiliteta (13-15).

Kako je najveći udeo fertiliteta ostvarivan u okviru braka, pad univerzalnosti braka, porast stope divorcijaliteta i alternativne forme zajedništva doveli su neminovno i do rađanja koje je ispod nivoa potrebnog za stacionarni model stanovništva. U svetlu globalizacije i nastalih promena u savremenom društvu, uočava se sve veći broj partnera koji ne žele da imaju decu.

Ubrzana modernizacija, migracije iz ruralnih u urbana područja, visoko učešće žena u radnoj snazi sa punim radnim vremenom, nezaposlenost, nezadovoljavajući ekonomski standard, neadekvatna podrška u vezi sa usklađivanjem obaveza na poslu i u porodici, problemi čuvanja dece, kontrola rađanja, nedovoljna materijalna podrška porodicama sa decom samo su neki od faktora nedovoljnog rađanja dece (16-18).

Rezultati istraživanja su pokazali da je došlo do promena u starosnom obrascu rađanja, odnosno pomeranja rađanja iz mlađih starosnih grupa žena ka starijim. Sve manji broj žena se odlučuje za rađanje u dobi optimalnoj za rađanje, prema biološkim i medicinskim kriterijumima. Došlo je do porasta prosečne starosti majke pri rođenju deteta sa 25,9

godina u 1991. na 29,6 godina u 2016. godini (19). Odlaganje rađanja predstavlja zajedničku karakteristiku savremenog društva i jednu od glavnih odlika druge demografske tranzicije čije su glavne odlike porast rađanja nakon 30 godine i najviše stope rađanja između 25-29 i 30-34 godine starosti. Međutim, pojava odlaganja rađanja ne mora nužno voditi ka niskoj ili veoma niskoj stopi ukupnog fertiliteta, što potvrđuju primeri Irske, Švedske, Norveške ili Danske, kod kojih je prosečna starost majke pri rođenju deteta viša za 1,5-2 godine nego u Srbiji (20). Predominantan uticaj na odlaganje formiranja porodice i rađanja dece, u većini evropskih zemalja, ima faktor tercijarnog obrazovanja, pozicioniranja na poslu, stabilnost na poslu, što predstavlja obezbeđenje relativno zadovoljavajućeg životnog standarda (21,22).

Rezultati ovog istraživanja pokazali su da prevremeni porođaji čine 7,1% od ukupnog broja porođaja, sa prosečnom stopom od 6,6/100 živorođenih i beleži se kontinuirani trend porasta stope prevremenih porođaja. Najčešći su kod trudnica između 40-50 godina starosti, pa kod trudnica mlađih od 15 godina. Prema podacima SZO iz preko 180 zemalja, stopa prevremenog porođaja kreće se od 5% do 18% živorođenih beba. Više od 60% prevremenih porođaja javlja se u Africi i Južnoj Aziji. Posmatrano prema ishodu trudnoće, najveći broj mrtvorodene dece nalazimo u grupi prevremenih porođaja (66%). Slične rezultate nalazimo i u drugim studijama koje ukazuju da deca iz pretermijskih porođaja čine oko 70% ukupnog mortaliteta novorođenčadi (23).

Rezultati ovog istraživanja su pokazali da se beleži trend opadanja porođaja kod adolescentkinja ispod 19 godina, što je svakako pozitivno ukoliko se zna da trudnoća i rađanje

**Table 4.** Children born by pregnancy outcome, Serbia, 2007-2016

Newborns	Births			
	Premature No (%)	In term No (%)	After term No (%)	Total No (%)
<b>Total births</b>	47,358 (7.1)	622,647 (92.7)	158 (0.02)	671,715 (100)
<b>Live births</b>	41,677 (6.2)	621,341 (99.8)	156 (0.02)	667,661 (100)
<b>Stillbirths</b>	2,681 (66.1)	1,306 (32.3)	2 (0.05)	4,054 (100)

one woman amounted to 1.46, which is lower than the European average, which amounted to 1.58 children per one woman (12). In other words, since 1999 the level of births has been continuously 30% lower than the level necessary for the simple reproduction of the population when The Republic of Serbia is observed as a whole. This means that generations of women, who will give birth between 2017 and 2034, will be one-third smaller in comparison to generations, which were born between 1999 and 2016 (12).

The change of pattern regarding the reproductive behavior directed towards the acceptance of low reproductive norms is conditioned by the greater number of different factors: social, economic, political, demographic, cultural-psychological, as well as groups of social and individual norms that appeared in the area of changed living conditions, and that were manifested through the postponement of pregnancies in the optimal life age and the lower rate of the total fertility (13-15).

Since the majority of women gave birth in marriage, the decrease in the number of marriages, as well as the increase in divorce rates and alternative forms of community and fellowship have inevitably led to the number of births that are below the level necessary for the stationary model of the population. In light of globalization and changes in contemporary society, it has been noticed that more and more couples do not want to have children.

Rapid modernization, migrations from rural to urban regions, a high percentage of women who have full-time jobs, unemployment, unsatisfactory economic standard, inadequate support in relation to all duties at work and in the family, problems that appear in relation to

taking care of children, birth control, insufficient material support to families with children are only some of the factors relating to the insufficient number of births (16-18).

The results of the research showed that there came to the age-related changes, that is, to the postponement of birth from younger age groups to older ones. Fewer and fewer women decide to give birth to children at life stages which are optimal for that, according to biological and medical criteria.

There came to an increase in the general age of mothers at birth from 25.9 years in 1991 to 29.6 years in 2016 (19). The postponement of birth is the common characteristic of contemporary society and it is one of the main characteristics of the second demographic transition, whose main traits are the increase in births after 30 years and the highest birth rates in the age groups 25-29 and 30-34. However, the occurrence of the postponement of birth does not necessarily have to lead to a low or very low rate of total fertility, which is confirmed by the examples of Sweden, Norway, or Denmark, where the average age of mothers at birth is higher for 1.5-2 years than in Serbia (20). The factors of tertiary education, positioning at work, stability at work that secures the relatively satisfactory life standard have the predominant influence on the postponement of family planning and birth in the majority of European countries (21, 22).

The results of this research showed that preterm births made 7.1% of all births, with an average rate of 6.6/100 live births, and the continuing trend in the increase in the preterm birth rates was noted. They were the most frequent in pregnant women aged 40 to 50 years, and then in pregnant women younger than 15. According to the data of the World Health

u adolescenciji nose odgovarajuće rizike. Komplikacije zbog trudnoće i porođaja su glavni uzrok smrti žena starosne grupe 15-19 godina. Rizik od smrtnog ishoda dece do 5 godina takođe je za 28% veći kod dece koju su rodile majke adolescenti (24). Niske reproduktivne norme su duboko uslovljene i pripadaju kategoriji dugoročnih fenomena, i stoga se nameće potreba njihovog kontinuiranog praćenja, u različitim uslovima i sredinama, što će omogućiti kompleksnije zaključke i definisanje opštih i specifičnih ciljeva i mera populacione politike u budućnosti (25).

### Zaključak

Na osnovu svih dobijenih rezultata istraživanja može se zaključiti da postoji trend opadanja broja porođaja u Srbiji. Zbog kompleksnosti problema, mere populacione politike moraju biti usmerene na politiku podsticanja rađanja, politiku prema migracijama, politiku u vezi procesa starenja, prema programima planiranja porodice i prema programima u sistemu zdravstvene zaštite sa ciljem očuvanja i unapređenja očuvanju i unapređenju reproduktivnog zdravlja žena.

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Organization from more than 180 countries, the preterm birth rate ranged from 5% to 18% of live births. More than 60% of preterm births occurred in Africa and South Asia. As far as the outcome of pregnancy is concerned, the largest number of stillbirths was in the group of preterm births (66%). Similar results were found in other studies that pointed to the fact that children from preterm deliveries accounted for 70% of the total mortality of newborns (23).

The results of this research showed a declining trend of births in adolescents younger than 19 years, which is certainly positive if we take into account the fact that pregnancy and births in adolescence bear certain risks. Complications during pregnancy and delivery are the main reason for deaths in women aged 15-19 years. The risk of the deathly outcome in children younger than five is 28% higher in children born by mothers of the adolescent age (24). Low reproductive norms are deeply conditioned and belong to the category of long-term phenomena, and therefore, there is a need to observe them continuously in different conditions and environments, which would enable more complex conclusions and define of general and specific aims and measures of population policy in the future (25).

## Conclusion

According to the obtained results of this research, it can be concluded that the trend in the number of births has decreased in Serbia. Due to the problem's complexity, the measures of population policy have to be directed towards the policy of supporting birth, policy towards migrations, policy regarding the aging process, towards family planning programs, and towards programs within the system of healthcare aimed at preserving and improving the women's reproductive health.

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