Is the Second Demographic Transition a useful framework for understanding the spatial patterns of fertility change in Serbia at the beginning of the 21st century?

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ABSTRACT

Gaps in comprehension of demographic change in the region of ex-Yugoslavia after 1990, caused by a lack of reliable data series, frequent change of borders, and distinctive historical and cultural tradition in comparison to other post-communist societies, motivated us to contribute to the understanding of the spatial diffusion of recent profound fertility changes in South-Eastern Europe. We analysed changes in the spatial pattern and distribution of typical fertility indicators of the second demographic transition at the sub-national level in Serbia in order to find out whether these demographic shifts could be interpreted to be similar to those in Central and Eastern Europe. We found that differences in economic, historical, and cultural development between sub-regions of the country strongly affect spatial patterns of fertility change. Also, this paper suggests that the sub-regions forerunners of the first demographic transition could be considered as the cores of diffusion for the second demographic transition.

1. Introduction

In the European context, the second demographic transition (SDT) was studied through various socio-demographic processes including: fertility decline, mortality impact on fertility change, marital postponement, non-marital fertility, partner relationships, changing household forms etc. Besides reporting general remarks on the very concept of the second demographic transition as regards to its ideational and cultural drivers and universality issues (Coleman 2004; Esping-Andersen, Billari 2015), certain doubts are often expressed with respect to the applicability of this theoretical concept outside the region where it was originally recognized as a process (Lesthaeghe, Neidert 2006). As one of the SDT proponents recently stressed, there is growing evidence that phenomena such as sub-replacement fertility, rising shares of cohabitations, and non-marital fertility are spreading worldwide (Lesthaeghe 2014). Still, some authors associate these factors with the rise of poverty formulated through the 'pattern of disadvantage' (cohabitation as a characteristic of lower social stratum); therefore, expressing doubts that SDT mechanisms of cultural shifts influence demographic changes in Eastern Europe (Perelli-Harris, Gerber 2011). Furthermore, divergence in trends of SDT fertility indicators between and within European countries is evident (Billari, Liefbroer 2010). For that reason, Lesthaeghe (2014) has recently suggested that SDT should be rather conceived as a narrative for understanding the profound cultural change that will sooner or later induce a variety of demographic changes thus implying that cross- and within-country differences in levels of SDT indicators are inevitable.

In this regard, exploring whether a fertility change typical for SDT has been spreading from its source towards the East seems to be a relevant research topic. The interpretation of abrupt and fast demographic changes that followed the fall of the Iron curtain in European post-socialist countries (the CEE term often comprises all former socialist countries including the states successors of Yugoslavia) using the framework of SDT has been a frequent research topic in this century (Philipov, Kohler 2001; Sobotka 2003, 2008, 2011; Sobotka, Zeman, Kantorova 2003; Rašević 2004; Muresan 2007; Hoem et al. 2009; Kuhar, Reiter 2010; Kurek 2011a; Perelli-Harris, Gerber 2011; Botev 2012; Walford, Kurek 2016). Yet, literature explaining demographic changes in CEE countries after 1990 usually do not fully cover the region of former Yugoslavia, which is mainly due to the lack of reliable data series and frequent changes of borders ever since Yugoslavia's dissolution. In addition, the region of former Yugoslavia also had a distinctive history or

cultural tradition in comparison to the other former socialist countries (Sobotka 2003).

Moreover, divergent trends in the onset and tempo of the fertility transition had been noted across sub-regions of the former Yugoslavia during the socialist period, which was distinctive from the relative homogeneity of Eastern Europe (Nikitović 2011, 2016; Josipovič 2016; Lerch 2018). The strong sub-regional differences in demographic change, which were well documented in Yugoslav demographic literature (Josipovič 2016), highlighted early adopters of fertility transition in the region (Slovenia, Croatia, and Serbia but excluding Kosovo). Declines in fertility below replacement level started in Croatia and Serbia (excluding Kosovo) approximately at the same time as it started in the vanguard countries of SDT (Nikitović 2016). This peculiarity was acknowledged to a limited extent in newer studies (Frejka, Gietel-Basten 2016; Nikitović, Bajat, Blagojević 2016; Lerch 2018), which partly can be attributed to data issues generated by the frequent change of national boundaries in the region.

When analysing the post-1990 period, Sardon (2001) noticed that strong sub-regional differences of the former Yugoslavia with respect to other former socialist countries could be hidden if the levels of indicators are examined as a whole, especially when analysing nuptiality levels and non-marital fertility. Additionally, specificities of Yugoslav socialism in relation to the Eastern bloc variant were often marked as a distinctive feature that can induce specific demographic outcomes in the socialist context (Rašević 2004). However, these specificities have led some authors to conclude that the patterns of change typical for SDT could not be relevant for explaining fertility changes in the region of former Yugoslavia (Kuhar 2009); whereas, others argue that SDT has been blocked in this region since 1990 (Bobić, Vukelić 2011).

Despite opinions that the concept of the second demographic transition is limited in Balkan countries, recent macro-level evidence suggests that Serbia[1] may have begun to follow the post-socialist pace of this transition after a period of stagnation in the 1990s (Nikitović, Bajat, Blagojević 2016). We therefore aim to examine if there is enough evidence for determining spatial diffusion of fertility change typical for SDT in Serbia at the beginning of this century. In other words, this study aims to contribute to the understanding of the spatial diffusion of recent profound fertility changes occurring throughout South-East Europe.

Although the proponents of SDT have no doubts when it comes to spatial spreading of this transition from North-West to South-East Europe since the 1990s, a recent comprehensive study on non-marital

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1   In this paper, it does not include the disputed territory of Kosovo, which unilaterally proclaimed independence of Serbia in 2008. Kosovo is currently recognized as an independent state by 108 of 193 UN member states and 23 out of 28 European Union member states.

fertility (a typical SDT indicator) across sub-national regions of Europe showed that its spatial diffusion is not so straightforward and suggested that state borders are still more relevant than regional ones with respect to non-marital fertility (Klusener, Perelli-Harris, Sanchez Gassen 2013). However, some findings from the aforementioned study showed that a more detailed spatial analysis would shed more light on understanding recent spatial patterns of fertility change in South-Eastern Europe. For that reason, we focus on the spatial pattern and distribution of selected SDT indicators at the municipality level in Serbia based on spatial autocorrelation analysis in order to find out whether recent demographic shifts can be interpreted within the framework of the second demographic transition. In addition, we aim to discuss these findings in the context of regional diversity in comparison to countries of former communist regimes.

Geographic differentials in diffusion of innovations proved to be significant for sub-national differences in the onset of the first demographic transition in Serbia (Nikitović, Bajat, Blagojević 2016). Therefore, we expect that an analysis using lower spatial levels will help us to understand the spatial pattern of the current fertility transition in Serbia and whether it is similar to the patterns observed in CEE countries. The analysis is focused on common SDT indicators in terms of fertility aspects of the process: total fertility rate (TFR), mean age of women at childbearing (MAC), and percentage of births outside marriage (BOM).

2. Overview of the Fertility Change in Serbia in the Context of the Post-Socialist Societies

Fertility changes that could be interpreted in the framework of SDT lagged by at least 20 years in post-socialist countries when compared with the forerunners of the process in North-Western Europe. During the socialist period, CEE countries were characterized by different demographic development, particularly concerning fertility, in relation to the rest of Europe (Frejka, Gietel-Basten 2016). 'A demographic distinctiveness of European former Communist countries as a relatively homogeneous region had gradually developed between the mid-1960s and the mid-1980s' (Sobotka 2003: 453). In the 1970s and 1980s, institutional and cultural factors that jointly sustained the regime of universal and early reproduction under state socialism protected Eastern Europe from the fertility decline experienced in all other parts of Europe. Then, following the collapse of communist regimes, within a decade the CEE region experienced the lowest fertility rates in Europe (Sobotka 2003, 2011).

A sharp decrease in TFR in Eastern Europe during the 1990s was usually associated with political, social and economic distortions during the period.

The explanations of this relationship differed – some researchers highlighted the role of macroeconomic factors while others thought of economic and political transitions as a specific part of the second demographic transition in this region (Philipov, Kohler 2001: 38; Kurek 2011b). Anyway, after 1990, the diversification in terms of social, economic, and even demographic development inside the group of former socialist countries is obvious due to different speed of societal transformation (Botev 2012: 69). Therefore, some authors suggest that the process of second demographic transition 'is not a unitary movement that reached all the countries in Central and Eastern Europe roughly at the same time and had the same features throughout, no more than it was in Western Europe' (Hoem et al. 2009: 250). They investigated marriage formation risk in selected countries in Central and Eastern Europe and found that a particular drop in this indicator started in Hungary and Bulgaria after the early 1980s and in Russia and Romania half-a-decade and full decade later, respectively.

According to Sobotka (2011: 262), a strong decrease in period fertility rates have been accompanied and partly caused by a shift towards a later timing of first births. These changes were also followed with family transformations that resulted in the rise of non-marital births. However, in relation to the period before 1990, when the share of non-marital births did not exceed 10 per cent, the CEE region is currently characterised by diversity of this typical SDT indicator – from Nordic values in Bulgaria (more than 50 per cent) to half the West Europe values in Poland (just above 20 per cent).

2.1 Change in Fertility Rates in Serbia, 1950–2017

The general pattern of changes in the period total fertility rate in Serbia since 1950 was similar to those observed in most European countries: post-war baby boom followed by a decrease to the replacement level, and then to the sub-replacement level (Figure 1). The main difference in Serbia is that the baby boom came to its end already in the late 1950s. The decline in fertility was faster and ran deeper than in most European countries in spite of the same general determinants of fertility decline, such as the adoption of new norms and values and growing levels of female labour force participation (Kupiszewski, Kupiszewska, Nikitović 2012). As a result, TFR was already 15 per cent below the replacement level by 1971. Several factors stated in literature could help one to comprehend such a distinctive pattern. Those often include early liberalization (from 1952 to 1969) of women's right to abortion (Rašević and Sedlecky 2009: 385), which was typical for former socialist countries (Sardon 2001; Sobotka, Zeman, Kantorova 2003; Frejka 2008), and structural factors such as fast secularization and industrialization during the period of Yugoslavia implying abrupt migration from rural to urban areas
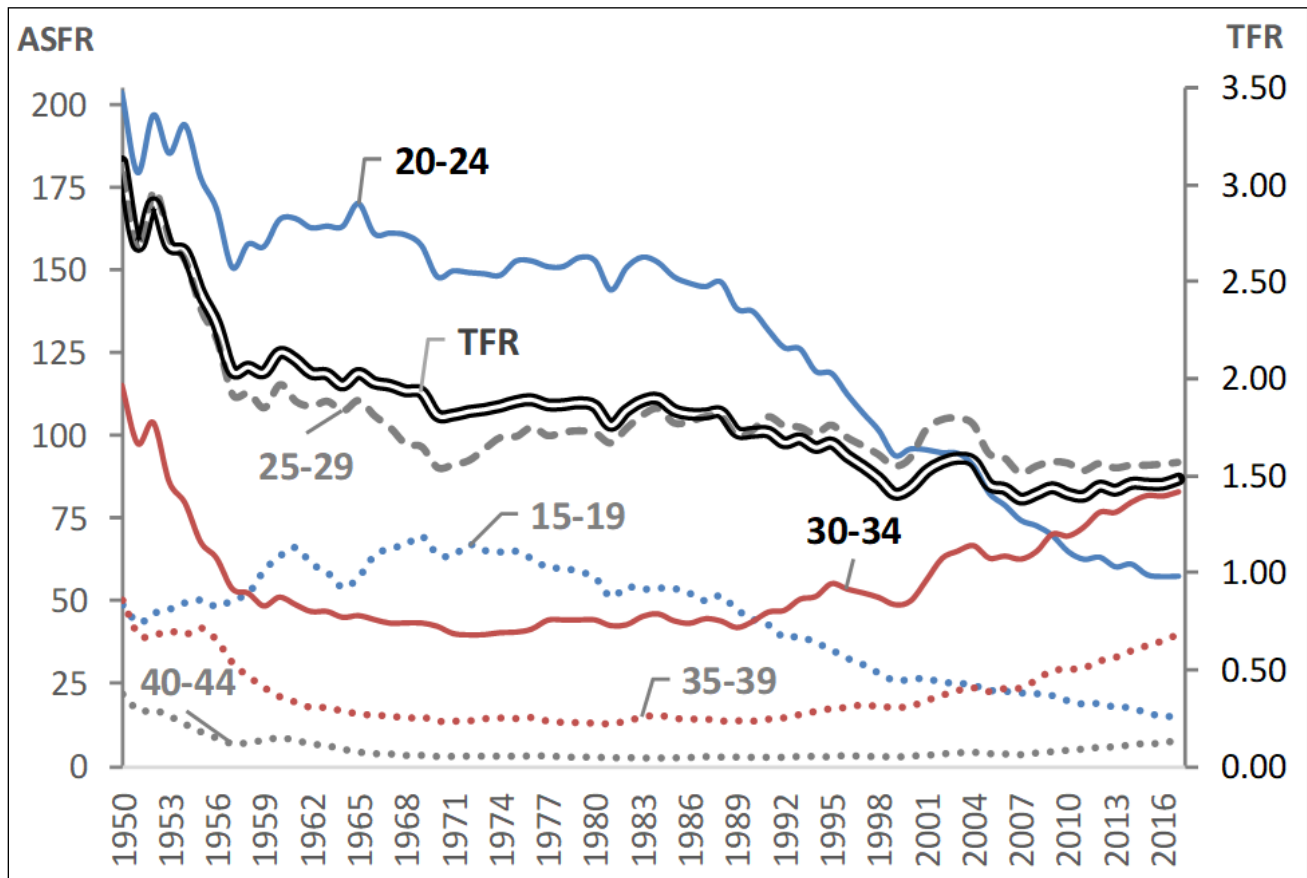
Fig. 1 Total fertility rate (double-line) and 5-year age-specific rates (solid, dashed and dotted lines) in Serbia excluding Kosovo, 1950–2017.
Notes: Time series after the census year of 2011 does not include the effect of international migration. TFR – Total fertility rate (the mean number of children that would be born alive to a woman during her lifetime if she were to pass through her childbearing years conforming to the fertility rates by age of a given year, and surviving); ASFR – age-specific fertility rates (the number of live births occurring during a given year per 1,000 women of reproductive age classified in five-year age groups).
Source: Statistical Office of the Republic of Serbia (Demographic Yearbook 2017; documentation tables).

associated with housing issues in urban areas. Yugoslav society, unlike socialist states in CEE at the time, was quite open to the impact of Western values in the sense of satisfying individual needs to a much greater extent, which arguably contributed to an increase in the economic and psychological cost of children. Furthermore, no efficient measures in the domain of population policy during the period were introduced (Rašević 2004:16).

The subsequent sharp fall in the TFR in Serbia began in the late 1980s, similar to Slovenia and Croatia. These three republics of former Yugoslavia were recognised as the 'early starters' sub-region in terms of fertility transition (Nikitović 2017). Although a steeper fall could have been expected due to wars and institutional crisis during the 1990s, the total fertility rate in Serbia has not experienced the lowest levels recently reported in Europe. Moreover, the war ambience could be a reason that contributed to prolonged consistency of traditional patriarchal values associated with family and childbearing (Sardon 2001; Rašević 2004; Petrović 2011; Lerch 2018). The total fertility rate in Serbia has oscillated between 1.4 and 1.48 since 2005. Most former socialist states that

belonged to the lowest fertility group have recently experienced a rise in TFR (Latvia, Russia, and Slovenia have even exceeded 1.5), which should be expected considering the pace of 'postponement transition' (Goldstein, Sobotka, Jasilioniene 2009).

Figure 1 demonstrates a transition in the age pattern of fertility in Serbia, which occurred over the last 60 years. Very high baby-boom rates at ages older than 20 rapidly declined during the late 1950s and early 1960s and kept principally stable during the 1970s and 1980s. Only the fertility rates of adolescents experienced an increase and relatively high levels during all the period of socialist Yugoslavia. This is usually explained by the moral primacy of patriarchy in spite of the new social institutions introduced by the socialist regime (Lerch 2018). However, since the late 1980s, the fertility rates of females younger than 25 began to decline sharply, while those of females older than 30 started to increase, actually at a slower pace. This was particularly prominent for the age groups 20–24 and 30–34, as they swapped their positions in terms of contribution to the total fertility – the latter group currently has a higher rate for the first time in the last 60 years. Moreover, the difference between

these two groups regarding their contribution to total fertility rate has been increasing since 2009. The highest fertility rates in the twenty-first century refer to women aged 25–29 (despite the recent drop) and is closely followed by women aged 30–34, which forms the current age pattern that is quite similar to the one observed in Poland (Walford, Kurek 2015). Although the indication of 'the postponement of childbearing for opportunistic reasons and on account of structural impediments' could have been noticed during the period of former Yugoslavia (Rašević 2004: 9), the clear onset in postponing childbirths in Serbia seems to be associated with the downfall of the socialist system, thus resembling the trends observed in other post-socialist societies. Consequently, the average age of childbearing increased from 25.9 in 1991 to 29.8 years in 2017. The latter value is lower by about half a year than in Slovenia, Estonia and Croatia, and by almost a year from the EU average, while it is similar to that in Latvia, Hungary and Poland (Eurostat 2019).

2.2 The Share of Non-Marital Births in Serbia, 1950–2017

The share of non-marital births is one of the typical indicators reflecting changes in demographic behaviour associated with the second demographic transition. This indicator raised in Serbia from 8.0 per cent in 1950 to 26.3 per cent in 2017. However, the position of Serbia regarding the share of non-marital births has shifted downwards in the European context during the last 60 years. Since the late 1950s and during the 1960s the share was stable around 12%, placing Serbia just behind Iceland and Austria in 1960 (12.2 per cent), and behind Iceland, Sweden, Estonia, and Austria in 1970 (11.8 per cent) (Penev, Stanković 2010). Given the universality of marriage and childbearing, the rise of the share at the time was due to a significant drop in the number of marital births caused by the termination of the short-lived baby-boom period (Figure 2), much shorter with respect to most European countries (Kupiszewski, Kupiszewska, Nikitović 2012).

The share of non-marital births was almost the same in 1968 and 1988, while in between it dropped. This was induced primarily by the emergence of the baby-boom echo generations, which accordingly affected the number of marital births and lowered the share of non-marital births. The significant rise of the indicator started in the late 1980s as the end of the socialist system was approaching, a trend that was similar to what was observed in most of former socialist countries. However, the share of non-marital births in Serbia in 1990 (13.1 per cent) was just above those in the Netherlands and Belgium and ahead of most former socialist societies. In 2017,
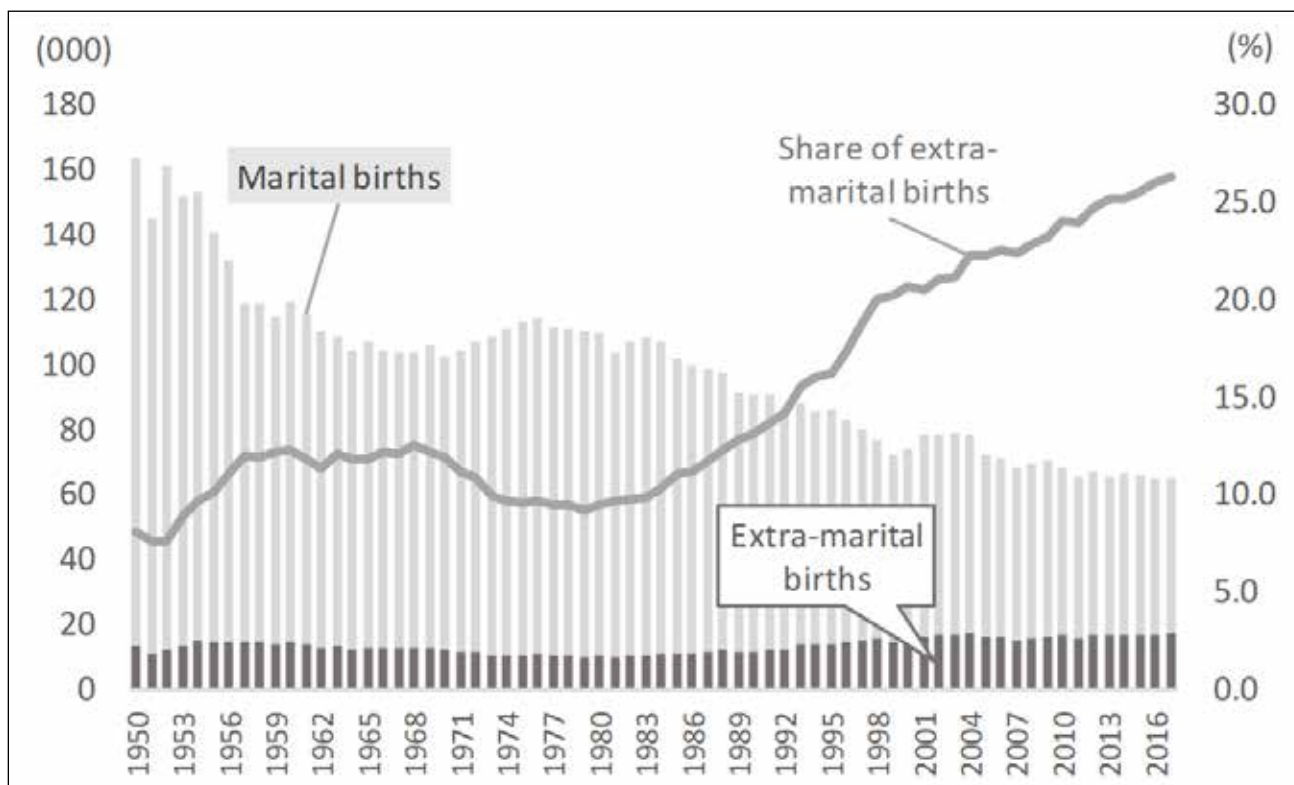

Fig. 2 Number of livebirths by legal marital status (primary axis) and the percentage of extra-marital births (secondary axis) in Serbia excluding Kosovo, 1950–2017.
Note: Time series after the census year of 2011 does not include the effect of international migration. Share of extra-marital births – the proportion of live births outside marriage.
Source: Statistical Office of the Republic of Serbia (Demographic Yearbook 2017; documentation tables).

Tab. 1 Distribution of municipalities (LAU-2) according to the categories of relevant input data in the census years of 2002 and 2011.

Total population size	Frequency of LAU-2		Number of women aged 15–49	Frequency of LAU-2		Number of livebirths	Frequency of LAU-2	
	2002	2011		2002	2011		2002	2011
<10,000	6	11	<2,000	5	13	<100	11	36
10,000–19,999	50	56	2,000–4,999	60	64	100–199	49	44
20,000–49,999	60	51	5,000–9,999	40	37	200–499	50	45
50,000–100,000	27	23	10,000–20,000	30	26	500–1000	30	16
>100,000	18	20	>20,000	26	21	>1000	21	20
Average / LAU	46,571	44,639	*Average* / LAU	11,238	10,033	*Average* / LAU	488	418

Note: Data on the number of livebirths refer to the three-year average over the census years.
Source: Statistical Office of the Republic of Serbia (Census of Population, Households and Dwellings in the Republic of Serbia, 2002 and 2011; documentation tables).

it was positioned much lower, leaving behind, apart from Switzerland, Azerbaijan, Cyprus, Greece, and Turkey, only countries from Eastern Europe (Poland, Belarus, Ukraine, Moldova) and the successor states of the former Yugoslavia except Slovenia (Eurostat 2019). The share of non-marital births in Serbia in the twenty-first century resulted mainly from pre-marital cohabitations that are more typical for people in disadvantaged economic positions, such as lone mothers including those in extended multiple generation families (Penev, Stanković 2010; Stanković 2014). It suggests that the recent rise of the indicator does not reflect spreading of cohabitation as an alternative to marriage (Petrović 2011; Bobić, Vukelić 2011). This is in line with findings from most post-socialist societies, where the diffusion of cohabitation has been rather slow (Muresan 2007, Sobotka 2008).

The following spatial analysis of the SDT indicators (TFR, MAC and BOM) will show that a variety of other factors need to be considered in Serbia in order to gain an understanding of their substantially diverse distribution at sub-regional levels.

3. Data and Methods

3.1 Data sets and territorial disposition

The spatial analyses were conducted at the local administrative unit (LAU) 2 level, which refers to municipalities in Serbia (Figure 3). The values of the analysed indicators were matched to GIS shapefiles of the municipalities' borders. These analyses are exclusively referred to census years as the official population estimates for the years out of intercensal periods do not include international migration. In this way, we wanted to get the values of the indicators as realistic as possible, which is particularly important in case of typical emigration municipalities.

Data on live births and population classified across five-age groups and sex were provided by the Statistical Office of the Republic of Serbia. Legal marital status was used as a criterion for identification of live births outside marriage. Each indicator was calculated for the last two census years – 2002 and 2011, as a three-year average over the periods 2001–2003 and 2010–2012, respectively, in order to smooth out annual fluctuations in the number of livebirths. The calculations were made following the administrative division in 2002 as no data for 2002 were available for the new six municipalities that had been established by the time of the 2011 census. Consequently, the results of the analyses in the paper were distributed across the total of 161 municipalities in Serbia excluding Kosovo. Out of that number, 42 municipalities have city status (16 of them are actually included within the City of Belgrade) based on the administrative criterion, which comprise 63.2 per cent of the total population in the country as to the 2011 census. Table 1 shows the basic descriptive statistics of the relevant input data across municipalities in the census years of 2002 and 2011. The interactive map depicting the values of calculated SDT indicators on the municipality level (LAU-2) is available in HTML format at the Web page http://osgl.grf.bg.ac.rs/static/materials/demography/tfr_mac_bom.html

3.2 Global and Local Spatial Autocorrelation Indices

The global Moran's I statistics (O'Sullivan, Unwin 2003) and local indicators of spatial association (LISA) (Anselin 1995) were calculated in order to outline spatial autocorrelation globally and to identify spatial clusters with respect to percentage difference in the SDT fertility indicators for 2002 and 2011.

As global Moran's *I* index recapitulates autocorrelation values over the entire study area, inherent spatial autocorrelation is necessary to calculate indices like LISA in order to assess significant local spatial clustering around an individual location.

In the first step, Incremental Spatial Autocorrelation (ISA) (ESRI 2012) was conducted to determine

Fig. 3 The map of Serbia with local administrative units (LAU-2).

the distance associated with peak clustering for all SDT indicators. The value obtained from ISA was then used as a distance threshold or radius for determining proximity weights (O'Sullivan, Unwin 2003) when calculating global and local spatial autocorrelation indices.

4. Spatial Analysis of Fertility Change in Serbia, 2002–2011

The analysis of the three fertility indicators connected with SDT at the level of local administrative units refers to the main objective of the study. Table 2 summarizes the changes of these indicators across municipalities in Serbia from 2002 to 2011.

The drop in TFR was significantly higher in rural than in urban areas in this period. As expected, the gap in MAC has even extended between urban and rural areas. Although the higher rise in BOM could be expected in rural than in urban areas in accordance with the recent changes in the European context (Walford, Kurek 2015), a BOM in rural municipalities is 30 per cent higher than in the cities of Serbia according to the 2011 Census. This peculiarity, which is analysed in more details across municipalities, might point to the specific forms of SDT that are atypical for countries where this process was originally described.

The next introductory step of the spatial analysis involves inspecting whether there is a correlation between each of the two pairs of indicators distributed across municipalities during the two census years, 2002 and 2011. The only significant correlation was found indicating that the mean age of mothers at childbirth is negatively associated with the share of births outside marriage, with Pearson coefficient of correlation raising between 2002 ($r = −0.35$, $p < .001$) and 2011 ($r = −0.44$, $p < .001$). This correlation pattern includes two types of association, but with opposite directions – one refers to municipalities where MAC is lower while BOM is higher and the other to municipalities where MAC is higher while BOM is lower. The first one could be expected in less developed and mainly rural areas, while the latter one

could be more typical for highly urbanized and more developed sub-regions of the country. In both cases this correlation suggests that cohabitation is still not common alternative to marriage as it was noted in recent studies on fertility and union formation in Serbia. The similar findings on this SDT indicator may be determined among countries of ex-Yugoslavia excluding Slovenia as well as in Poland and Slovakia (Bobić 2014). The following spatial analysis across municipalities in Serbia provides a deeper insight in sub-national differences in fertility.

The two methods used aimed at checking whether there is a spatial spread of SDT fertility indicators throughout Serbia. One implies a descriptive analysis of the spatial differences of each indicator across the country and their dynamics between the two last census years, 2002 and 2011, while the other relies on spatial autocorrelation indices calculated upon relative changes (%) over the intercensal period 2002–2011.

4.1 Total Fertility Rate

According to the 2002 census, TFR was below the replacement level in almost all of the 161 municipalities in Serbia, as only 8 of them reached 2.1 or above (Figure 4(a)). Five of these eight municipalities were predominantly populated by Muslims, the religious group who were the last in the country to enter the final stage of demographic transition. The remaining three municipalities belong to the group with the highest share of persons living abroad for more than a year. Unlike 2011, the TFR for 2002 included the births by this group of emigrants indicating that the TFR was actually lower than 2.1 in these municipalities (Rašević, Penev 2010).

Due to a further decline of TFR, only three municipalities with predominantly Muslim populations were above 2.1 in 2011, while ten municipalities dropped to just around 1 (0.99–1.09) (Figure 4(b)). Only 13 per cent of municipalities (21 of 161) did not decline in TFR between the census 2002 and 2011. The highest increase (mainly lower than 10 per cent) took place in the northern, most urbanized, part of the country including municipalities in the area of the two largest

Tab. 2 Quantitative analysis of the second demographic transition indicators in urban and rural local administrative units in Serbia, 2002–2011.

	Total fertility rate		Mean age of women at childbirth		Births outside marriage (%)	
	Urban	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**
year 2002	1.54	1.65	27.37	26.18	20.46	23.69
year 2011	1.44	1.35	28.90	27.16	23.27	30.29
% difference	−6.51*	−17.79**	5.59**	3.73**	13.75*	27.87**

** Significant at $p = 0.001$; * significant at $p = 0.05$ using Mann–Whitney test.

Note: A municipality is classified into urban or rural depending on its administrative status according to the current administrative division of local spatial units (cities and municipalities).

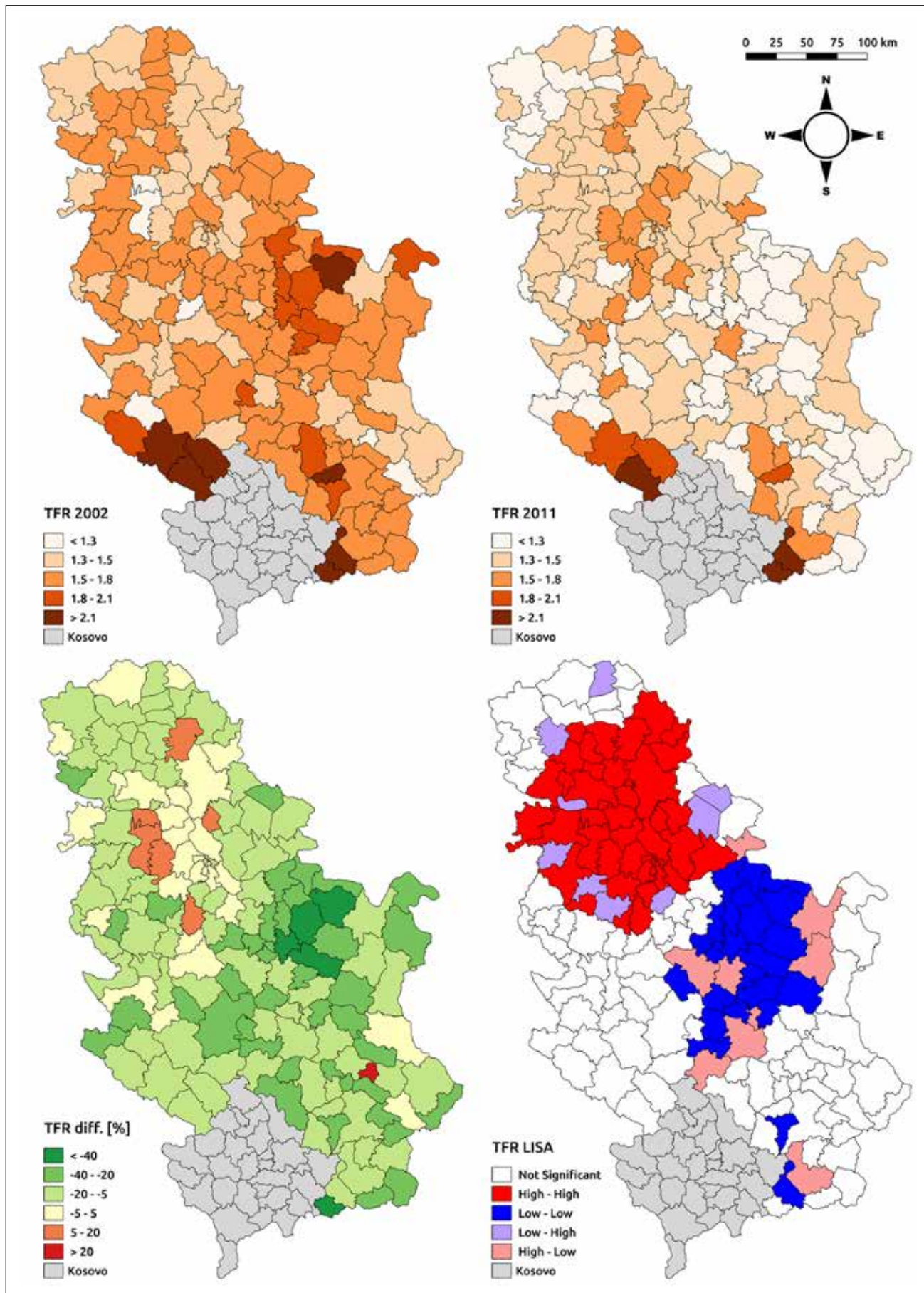Source: Statistical Office of the Republic of Serbia (documentation tables).

Fig. 4 Total Fertility Rate in Serbia at LAU-2 level: (a) 2002, (b) 2011, (c) percentage difference for the period 2002–2011, (d) LISA cluster map of percentage difference for the period 2002–2011.

cities – Belgrade (the capital) and Novi Sad (the capital of the province of Vojvodina). This result indicates the effect of postponing births to later ages (more typical in urban areas), rather than the rise in the cohort fertility (Rašević 2015).

A quarter of all municipalities had experienced a decrease in TFR between 20 and 40 per cent from 2002 to 2011 (Figure 4(c)). Most of these municipalities are in eastern and southern Serbia, the least developed regions in the country according to the 2014 official scale of development listed on the website of the National Agency for Regional Development. The observed decline during the period was even larger than 40 per cent in several municipalities in the northeast of this area, which is distinguished by the highest share of population living abroad (Penev, Predojević-Despić 2012). Given a difference in methodology when the rates for 2002 and 2011 are compared (the latter one did not include births by emigrants), this strong reduction could not only be attributed to the actual fertility fall (Rašević, Penev 2010).

Global Moran's I = 0.342 (Z = 11.824, p < 0.001) for the TFR (threshold radius h = 70 km) in Serbia indicates moderately clustered spatial patterns with high statistical significance. The LISA cluster map designates locations with significant local Moran indicators assorted by different types of spatial correlation: 1) High-High association, a municipality with high TFR value has neighbouring municipalities with high TFR values (positive spatial correlation); 2) Low-Low association, a municipality with low TFR value has neighbouring municipalities with low TFR values (positive spatial correlation); 3) Low-High association, a municipality with low TFR value has neighbouring municipalities with high TFR values (negative spatial correlation); 4) High-Low association, a municipality with high TFR value has neighbouring municipalities with low TFR values (negative spatial correlation).

The local Moran's I statistics singled out a big compact High-High cluster in TFR denoting a metropolitan area that includes the two largest cities (Belgrade and Novi Sad) located in northern Serbia (Figure 4(d)). The cluster, primarily, reflects a quite small increase in TFR between 2002 and 2011 in the area. It might be explained by both the development of housing associated with a recent concentration of industry particularly in suburbs of the area induced by the proximity to important highways, and the ongoing process of south-to-north internal migration (Nikitović, Predojević-Despić, Marinković 2015). A big Low-Low cluster in East Serbia indicates a decrease in TFR, which is partly caused by the changes in methodology between the 2002 and 2011 census, but also reflects the indirect effects of continuous international emigration from this area (Penev, Predojević-Despić 2012; Fassmann, Musil, Gruber 2014).

4.2 Mean Age of Women at Childbirth

The highest values of MAC in 2011 are recorded in the largest urban centres of Serbia, almost exclusively in those located in north and west parts of the country, except for Niš – the largest city in southern Serbia, while the lowest values refer to the east (Figure 5(b)). The number of municipalities with MAC higher than 28 years increased five times (from 12 to 60) between 2002 and 2011. The minimum values of MAC (observed in the southeast – the least developed area of the country) remained almost the same after a decade (24.4 years in 2002 compared with 24.7 in 2011), while maximum MAC (recorded in the historic centre of the Belgrade City) increased from 30.4 to 32.2 years (Figures 5(a–c)). Only 9 of 161 municipalities did not report a rise of MAC between 2002 and 2011, clearly indicating the transition in the peak fertility towards older ages throughout the country. The largest increase in MAC (between 6 and 10 percent) during the 2000s occurred mainly in municipalities with smaller urban centres (most of them located in Central Serbia) and those where relatively lower values of MAC had previously prevailed.

Global Moran's I = 0.144 (Z = 5.338, p < 0.001) for the MAC (threshold radius h = 140 km) suggests less pronounced clustered spatial patterns with high statistical significance. As regards to local Moran's I statistics for the mean age at childbearing, there is almost a continuous High-High cluster connecting the area of the Belgrade City and Central Serbia (Figure 5(d)). The distribution of all four types of clusters could be explained by two processes. The first one refers to areas where MAC was previously very low indicating general spatial diffusion of demographic innovation. The other process is associated with recent trends in urbanisation (mostly pronounced along important road corridors in Serbia) indicating a higher mean age at childbearing in urban than in rural areas (Rašević 2015).

4.3 Live Births Outside Marriage

Eastern Serbia differs quite distinctively from the rest of the country in terms of the percentage of births outside marriage. The BOM values higher than 30 per cent were recorded in almost all municipalities in eastern Serbia, where BOM is even higher than 40 per cent in 11 municipalities for the year 2002. On the other hand, BOM is lower than 20 per cent in 71 of 161 municipalities in the country (Figure 6(a)). In 2011, the observed spatial polarization became even more pronounced (Figure 6(b)). The increase of BOM values in eastern Serbia is noticeable when compared to stagnating rate in southwestern Serbia (9 municipalities with BOM less than 10 per cent). Generally, the increase of BOM values and BOM range throughout the country are obvious in the period of
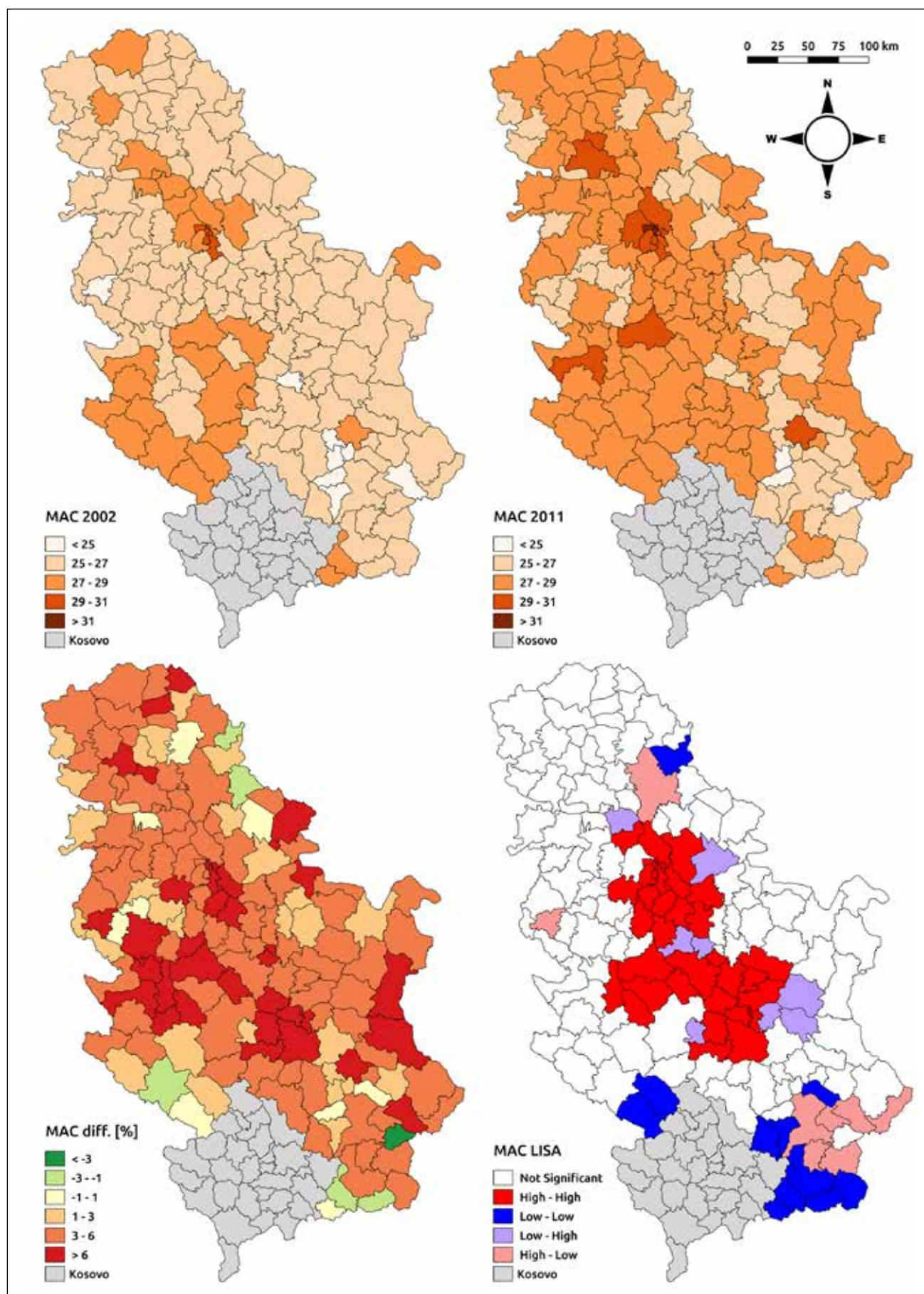
Fig. 5 Mean age of women at childbirth in Serbia at LAU-2 level: (a) 2002, (b) 2011, (c) percentage difference for the period 2002–2011, (d) LISA cluster map of percentage difference for the period 2002–2011.
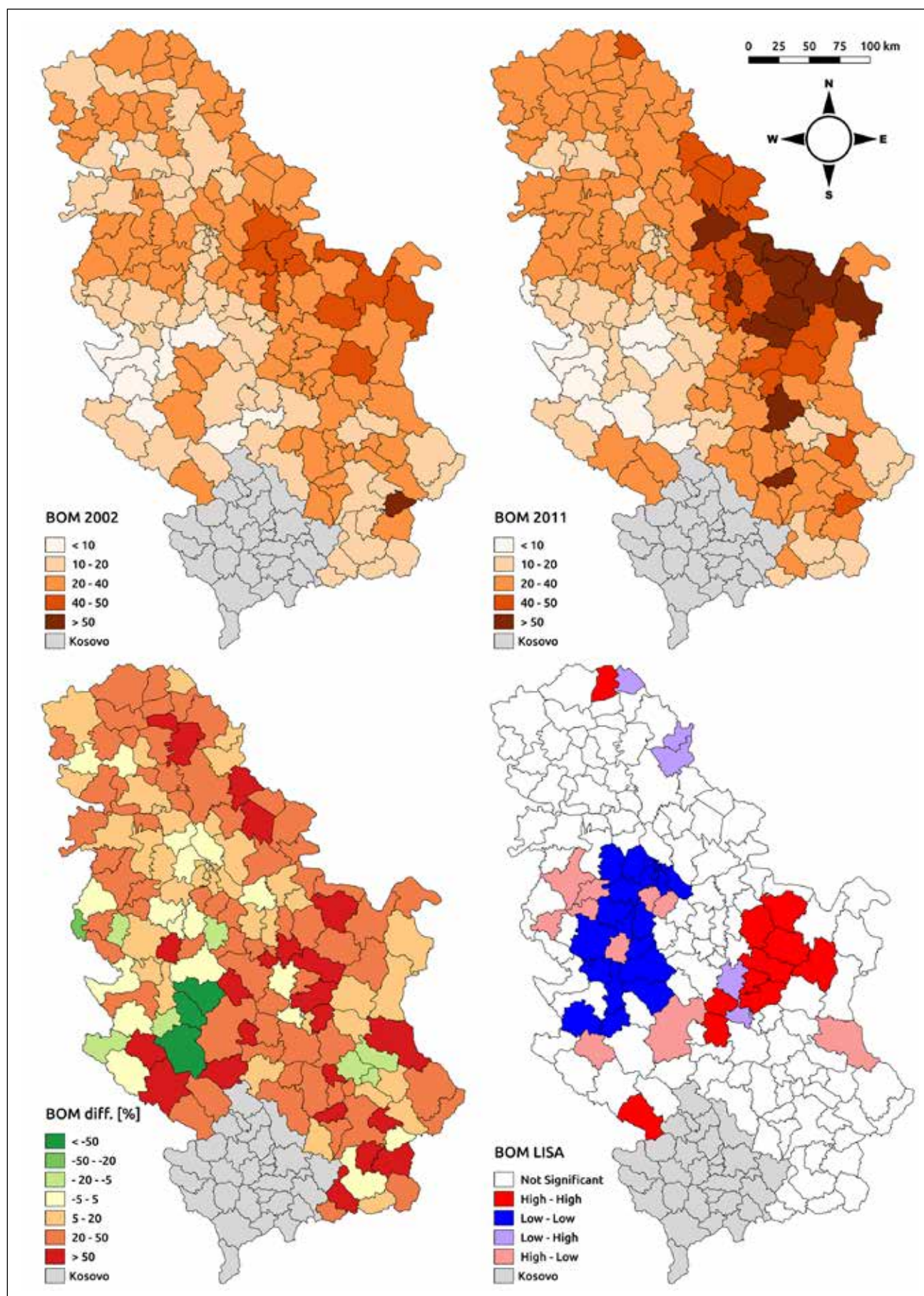
Fig. 6 Share of Live Births Outside Marriage in Serbia at LAU-2 level: (a) 2002, (b) 2011, (c) percentage difference for the period 2002–2011 (%), (d) LISA cluster map of percentage difference for the period 2002–2011.

2002–2011. The number of municipalities with BOM below 20 per cent dropped to 50, while the number of those with a share of births outside marriage higher than 40 per cent reached 29, of which 13 had a share higher than 50 per cent. Only 20 municipalities experienced a decline of BOM between 2002 and 2011, while the strongest drops were localized in the southwestern area characterized by the lowest values of the indicator. A total of 23 municipalities experienced a rise of BOM higher than 50 per cent (Figure 6(c)).

Global Moran's I = 0.078 (Z = 2.818, p < 0.006) for the BOM (threshold radius h = 52 km) indicates a certain degree of clustered spatial patterns with statistical significance. It should be noted that the share of BOM of around or below 20 percent was recorded in the largest cities of the country regardless of their geographic location, while only five urban centres (all of them in eastern Serbia) experienced BOM higher than 30 per cent. The local Moran's I statistics for BOM denoted two clusters that represent two distinctively different areas (east and west in relation to the main road corridor) with regards to the percentage difference in the share of births outside marriage between 2002 and 2011 (Figure 6(d)). One distinctive area refers to the largest urban centres in the more developed west sub-region, including central urban zones of the Belgrade City, characterized by the lowest share of BOM and its change over the period. The other distinctive area refers to municipalities in the less developed east sub-region with the highest share and highest increase of BOM. On the first glance, this observation could be considered as a paradox. However, it was noted that 'cohabitations and extra marital births in Serbia are more common among actors at the lower end of the stratification ladder … [as a result of] … rationally developed strategies in overcoming structural risks, although, without ideational changes typical to the theory of SDT' (Petrović 2011: 78). In addition, East Serbia could be considered as a specific sub-region given the distinctiveness of its demographic change since the mid-nineteenth century (Knežević 2013).

5. Discussion and Conclusions

The objective of this study was to determine whether recent spatial patterns of fertility change in Serbia, which we assumed to be associated with the second demographic transition, agree with those observed in post-socialist societies of Europe. Whereas most of the literature exploring whether and how SDT taking place in former Yugoslavia refers to the national level and to aspects of family change, we wanted to see if sub-national geographic differentials in diffusion of demographic innovations measured by key fertility indicators associated with SDT could shed more lights on the issue. We deployed our analyses from the national level, however special focus was maintained at the level of municipalities.

Concerning the national level, the total fertility rate and mean age at childbearing in Serbia follow paths similar to those in CEE countries. Even though the last sharp decrease of TFR began a little earlier than in CEE countries, it did not reach the lowest values as reported in CEE. This can be explained through a not so sharp transition from state socialism to new societal conditions and stubborn subsistence of traditional values associated with family formation during the civil wars in the 1990s (Petrović 2011; Bobić, Vukelić 2011; Lerch 2018). The latter reason could also have an impact on the much lower rate of non-marital fertility in Serbia than in most of CEE countries, which is almost the same as in Poland, and higher only than those in former Soviet republics and Croatia (Eurostat 2019).

The three general findings concerning changes of the analysed fertility indicators with respect to the type of municipality in Serbia were pointed in the first decade of this century: a) the decline in fertility has diffused from urban to rural areas, b) the gap in mean age at childbearing between urban and rural areas has widened, and c) the share of non-marital births became significantly higher in rural than in urban areas. The diffusion of values and ideas associated with low fertility norms from urban centres to peripheral areas of the country was already well noted during the first demographic transition (Watkins 1990). Also, the pronounced postponing of births in cities is in accordance with the recent changes in post-socialist societies (Walford, Kurek 2015). However, such a discrepancy between rural and urban areas in terms of non-marital fertility might be unexpected if we neglect that non-marital births in Serbia are mostly reported among women from lower social strata, which are often located in rural areas (Bobić 2014).

More specific results of the autocorrelation spatial analysis, as the pivotal analytic tool, denoted that the metropolitan area, which includes the two largest cities located in the northern Serbia, is the only one with a mild but significant increase of TFR in the country at the beginning of this century. At the same time, spatial diffusion of the rise in mean age at childbearing was registered throughout the country but was mostly pronounced along important road corridors connecting bigger towns. This indicates that the process is particularly associated with recent trends in urbanisation. Our results generally coincide with the findings from Czechia indicating that 'this stage in the transformation of reproductive behaviour began earlier in the largest city districts and districts with economic centres.' As such, the spatial patterns of fertility change demonstrate different speed of adaptation to the changes in reproductive conditions (Šprocha, Šidlo 2016: 228). In this respect, East Serbia is clustered in terms of a decrease in TFR, which could be to some extent associated with indirect effects of continuous,

long-lasting international emigration from that area. The diffusion of the increase in the proportion of non-marital births from its core in East Serbia was evident with respect to spatial statistics on the percentage difference of this indicator between 2002 and 2011. The two distinctive opposite clusters (East and Southwest Serbia) suggest that not only the tempo of this diffusion was rather slow, but the persistence of traditional values associated with family formation is very strong in the Southwest, which is recognized as the sub-region that was the last to enter fertility transition (Nikitović, Bajat, Blagojević 2016).

Specificities of East Serbia that relate to the analysed indicators of SDT, particularly as to the share of non-marital fertility, belong to the outcomes that might be unexpected to some extent. Furthermore, this sub-region stands as an exception with respect to the Hajnal line that reflects the nuptiality regime division between West and East Europe, which seems to be still relevant for differentials in non-marital fertility between sub-regions in Europe (Walford, Kurek 2015). East Serbia was the innovating sub-region as for the first fertility transition in the country (the late nineteenth century). Also, it could be an innovating area regarding the second transition, similarly to what Lesthaeghe and Neels (2002) concluded exploring the spatial diffusion of SDT in Belgium and France.

The drivers of the first demographic transition in East Serbia were atypical in a way similar to what could be the current specificity. In this sub-region, recognized by the great influence of the cultural model of the Vlach population, the fertility transition already started in the second half of the nineteenth century with the acceptance of birth control through the 'one-child system'. The most commonly identified cause of the transition was agrarian overpopulation due to the extensive farming of predominantly rural populations, which increased after the end of an immigration that was induced by the enlargement of the territory of Serbia. On the other hand, there were also indications that the trigger was endemic diseases such as syphilis (Knežević 2013).

Therefore, the specificity of East Serbia might be better perceived if it is considered from a longer historical and socio-cultural perspective, which highlights the importance of specific ethnic differences for understanding current fertility change in the sub-region. Furthermore, the influence of national borders on the diffusion of fertility changes associated with SDT could be questioned in this part of Europe. A recent study (Klusener, Perelli-Harris, Sanchez Gassen 2013) pointed out that most prominent national dividing lines with respect to non-marital fertility after 1990 shifted from West and Central to Southeast Europe. The finding was probably driven by study limitations regarding different levels of regional decomposition particularly between former Yugoslavia and its neighbours. The spatial analysis in this paper showed that national boundaries in Eastern Europe

are not so dividing with respect to SDT indicators. For example, the rise in non-marital fertility rates in Bulgaria resembles the one in East Serbia.

On a national scale, Serbia and Poland are very similar in terms of the level and family settings of non-marital fertility. However, only a closer look at the sub-national patterns of the diffusion of this indicator reveals that 'diversified level of extramarital births in the spatial arrangement reflects cultural and religious differences of the Poland's population' (Kurek 2011a: 393). Likewise, our results suggest that the diffusion of this SDT indicator in Serbia is clearly guided by differences in historical and cultural heritage between sub-regions of the country. Therefore, the spatial pattern of the share of non-marital births, as an indicator of ideational change, shows that typical SDT drivers may not be the decisive determinant for recent fertility change in Serbia. The fact that BOM is not only the result of modern cohabitations but is more attributed to a rise in unstable partnerships that end up with single mothers of poor socio-economic status supports this conclusion. Furthermore, the slow rise of BOM since the beginning of this century along with the highest and increasing level of postponement of births in urban and most developed sub-regions of the country questioning ideational roots of the change assumed by SDT. The societal anomie, slow transition to market economy and stable political conditions typical for the post-socialist countries, may also influence individual decisions to defer childbearing in case of the higher educated or to adapt their strategies associated with family formation in case of persons in disadvantaged socio-economic position (Perelli-Harris, Gerber 2011).

However, as Van de Kaa (2004: 8) pointed in his paper revisiting the concept of SDT, 'it is not of any great significance if countries and regions with different cultural endowments do not rapidly converge to a standard pattern'. Also, it is possible that societies like the Serbian society just follow a specific path of progression of SDT, as suggested by Sobotka (2008). In other words, the pattern of advantage and the pattern of disadvantage could be just two opposite sides of the same coin. This seems to be reasonable because both modern and traditional values influencing decisions of individuals concerning family formation were noticed at the same time in Serbia (Bobić, Vukelić 2011). It could be also interpreted as a very slow transition to what some authors refer to as the gender egalitarian family norms (Esping-Andersen, Billari 2015). The similar trend was noted in Romania indicating that the SDT process might be in progress as most of the 'threshold levels' of the onset of SDT were surpassed with exception of cohabitation, ultimate celibacy, and modern contraception (Muresan 2007: 65). Moreover, our study shows that the transition between traditional and modern concerning the demographic regime might have its geographical dimension in Serbia, too.

Finally, as Thornton and Philipov (2009) noticed, the ideational change behind SDT is important in explaining changes in marriage, cohabitation and childbearing in CEE; particularly for the belief that adopting modern family systems will help to produce modern political and economic accomplishments as they are interdependent. If one assumes that Serbia is on the course of SDT, it seems that further diffusion of the ideational changes throughout the region could be closely related to the process of EU enlargement to the East. For that reason, it will be beneficial to include the whole region of the former Yugoslavia in further research on sub-national patterns of fertility change. Currently, the issues on availability and quality of relevant demographic data are a serious obstacle to accomplish this.

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