ASSOCIATION OF DEMOGRAPHERS OF SERBIA

INSTITUTE OF SOCIAL SCIENCES
Institute of national significance for the Republic of Serbia

Универзитет у Београду
ГЕОГРАФСКИ ФАКУЛТЕТ

International Scientific Conference

Population in post-Yugoslav countries: (Dis)similarities and Perspectives

19 - 20 April 2024

Venue:
Institute of Social Sciences
Kraljice Natalije 45, Belgrade
Great Hall on the 1st floor

Publisher:

Institute of Social Sciences and Association of Demographers of Serbia

Belgrade 2024

For the publisher:

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ISBN 978-86-7093-273-9 DOI: 10.59954/PPYCDSP2024

INTERNATIONAL SCIENTIFIC CONFERENCE

POPULATION IN POST-YUGOSLAV COUNTRIES: (DIS)SIMILARITIES AND PERSPECTIVES

Book of abstracts

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BELGRADE, 19–20 APRIL 2024

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Foreword

With great anticipation and a profound sense of responsibility, we present the Book of Abstracts for the 'Population in Post-Yugoslav Countries: (Dis)similarities and Perspectives' International Scientific Conference. Hosted in Belgrade on the 19th and 20th of April 2024, this conference promises to be a landmark event, bringing together scholars, researchers, and policy makers at the forefront of demographic studies. This event marks the first and largest international conference under the auspices of the Association of Demographers of Serbia. The conference has been organized in collaboration with the Institute of Social Sciences and the Faculty of Geography at the University of Belgrade. It marks a traditional quadrennial demographic conference held in April in Belgrade after the disruption caused by the pandemic. The conference includes 50 abstracts by 74 authors from 8 different countries. The two-day conference is divided into 6 topical sessions, each moderated by two members of the organizing Institutions.

The post-Yugoslav region, with its rich history and multifaceted socio-political structure, offers a uniquely rich context for demographic research. The dissolution of Yugoslavia prompted significant transformations in regional population dynamics, each successor state facing varying implications. This conference seeks to explore these transformations, shedding light on the (dis)similarities and perspectives that have emerged over the past decades. The topic diversity and participant calibre reflect demographic research's interdisciplinary nature and relevance across a broad societal spectrum. From understanding depopulation and aging implications to analysing fertility and mortality patterns, or exploring migration dynamics and ethnic structures, the conference discussions are set to significantly enhance our understanding of the region's demographics.

More than a platform for presenting research findings, the conference offers scholars a valuable opportunity for meaningful

dialogue, fostering collaborations that transcend geographical and disciplinary boundaries. It is our hope that this gathering will inspire innovative approaches to demographic challenges, informed by the rich discussions and exchanges that will take place over these two days. We extend our gratitude to all contributors, participants, and organizers who have made this conference possible. Your dedication to advancing demographic research and your commitment to addressing the pressing issues facing our societies are what drive this conference's success.

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SESSION 1

DEMOGRAPHIC PROCESSES IN THE FORMER YUGOSLAV REGION

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Depopulation and deep aging: the former Yugoslav and western Balkans space between the second demographic transition and emigration

The article elaborates on the concept of deep aging where the overall aging effects of the second demographic transition are topped by the emigration of fertile contingent. The cases of former Yugoslav states and Albania are juxtaposed to enlighten the different demographic paths after the break-up of Yugoslavia. In the meantime, ever more pronounced emigration from all the former Yugoslav republics, including the Kosovo-Metohia territory, and Albania (as recently associated member of "the Western Balkans Six" European waiting room). In Slovenia, migrations acquired a pseudo-voluntary character somewhat similar to that of the later Yugoslav period. This leads us to the question if the maxima "the longer the period of EU membership the lesser the emigration from the country" is still true. Parallel processes of internal migration (resettlement from east to west and from south to north within the EU) and international migration (refugees, overseas migration) are discernible in Europe. The region of Western Balkans and former Yugoslav space share most of the demographic features to a lesser extent. With lower fertility and higher age-specific mortality the gap is increasing among the countries of the region. Yet there are also other, e.g. geographical, and ethnic, factors not directly connected with the pronounced emigration processes, so the contribution sets to explore these as well. The methodology involved in this research spans from the demographic methods and typical procedures for obtaining certain indicators. In addition, the geographic and spatial methods such as location quotients, densities, and complex aggregate indicators (typification, regionalization) are applied as well. The presented research is a result of the research programme on minority and ethnic studies and the research project on ethnic vitality.

Keywords: Former Yugoslavia, ethnic vitality, emigration, low-fertility countries, second demographic transition

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Cohort Fertility in the Former Yugoslav Countries

This study analyses trends in cohort fertility in the former Yugoslav countries. The goal is to identify and describe differences and similarities in demographic trajectories related to fertility behaviour. We consider a relatively long period, covering the transformation from agrarian to industrial capitalist societies during the late nineteenth and early twentieth centuries, and continuing with a rapid transition into socialist modernity after 1945. This era witnessed profound societal, political, and economic changes that strongly influenced fertility behaviour in the region, with key roles played by changes in women's roles, urbanization, and other socio-economic and socio-cultural factors crucial for family life. Our inquiry further extends to the more recent period, and examines how fertility-related demographic trajectories developed over the transition to the market economy during the 1990s and beyond. We aim to provide a detailed overview of cohort fertility patterns in former Yugoslav states, to detect countries with similar characteristics, and to assess the potential convergence among countries. Drawing data on the number of live births from the post-World War II censuses, we calculate and present indicators on completed cohort fertility rates, parity progression ratios, and parity distribution. Our findings indicate that fertility decline in former Yugoslav republics took place at varying paces and in different ways, and that the progression to higher birth orders played a crucial role in shaping the identified patterns. Employing cluster analysis, we identified three distinct groups of countries, with Croatia, Slovenia, and Serbia forming the low-fertility group. Bosnia and Herzegovina, North Macedonia, and Montenegro exhibited higher fertility levels, and Kosovo represents a unique example of a country with exceptionally high fertility in Europe. The results highlight the intricate interaction of historical, political, economic, and social factors that contribute to the observed clustering of countries. Our comprehensive analysis contributes to a better understanding of persisting differences and potential convergence in cohort fertility trends in the former Yugoslav region.

Keywords: Cohort fertility; former Yugoslavia; parity progression ratio; parity distribution

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https://doi.org/10.59954/PPYCDSP2024.3

Mortality dissimilarities in the context of demographic aging: the countries of Ex-Yugoslavia

Populations experienced a continued increase in longevity, most countries in the world witness demographic aging where longevity is increased. Generally, mortality declined at all ages, with varying intensities, as a result of heterogeneous factors affecting human lifespan. This paper considers switching regression estimation for six ex-Yugoslavian countries with the specification of a time-varying transition probability model of crude death rate. A two-state Markov switching means VAR estimates is used in which the mean growth rate of crude death rate is subject to regime switching, and where the errors follow a constant transition probability. The data for this study were obtained through a UN database, which consists of the crude mortality rate series containing the log difference of yearly crude mortality rate in the six countries of ex-Yugoslavia for 1990–2021. The results show that the estimates of coefficients on the intercept in the mean equation both differ from zero in Bosnia and Herzegovina, Serbia, Montenegro, and Slovenia (only for one equation) and are with opposite and statistically significant signs only for Montenegro and Slovenia. For Croatia and Macedonia, these coefficients are not different from zero. As to the transition matrix parameters, it can be seen that only for Bosnia and Herzegovina and Macedonia, and partially in Montenegro, increases in the log difference crude death rate are associated with higher probabilities of being in the high crude death rate regime, lowering the transition probability out of regime 1 and increasing the transition probability from regime 2 into regime 1. The transition probability summaries show a higher probability of remaining in the high output state for Macedonia, Serbia, and Bosnia and Herzegovina (0.96, 0.94, and 0.87, respectively). The higher probability of remaining in the low output state was found in Slovenia, Croatia, and Montenegro (0.96, 0.87, and 0.56, respectively). The appropriate expected durations in the first regime are approximately 26.41, 16.19, and 7.78 years for Macedonia, Serbia, and Bosnia and Herzegovina, respectively and 28.30, 7.80, and 2.28 years were the corresponding expected durations in the second regime for Slovenia, Croatia, and Montenegro, respectively. Therefore, the gain results

from the Switching VAR model point out that there are dissimilarities in terms of regime-switching of mortality rate among ex-Yugoslavian countries. Demographic aging will be more rapid and dramatic in the coming period for Bosnia and Herzegovina and Macedonia, and partially for Montenegro as a result of the advanced process of population aging and an older population that will determine the average value of crude death rate. On the other hand, as a result of some progress in reducing mortality, the degree of aging will decline in the coming period for Croatia, Serbia and Slovenia.

Keywords: Crude death rate, longevity, demographic aging, ex-Yugoslavia, Switching VAR, regime-switching, transition probability

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Emigration abroad from the Former Yugoslav Region – previous trends, current situation and challenges

Emigration abroad from the former Yugoslav region began in the mid-sixties of the previous century based on the political decision borders to be opened for temporary work abroad. During this period, the Socialist Federal Republic of Yugoslavia was the only socialist country that liberalized the residence of its citizens outside the country. Until the breakup of Yugoslavia, the emigration from the former republics abroad was with different scope and intensity. After that emigration abroad took place in different directions and noticed significant changes. The aim of the paper is to determine the changes of the emigration abroad from the former Yugoslav region before and after the breakup of Yugoslavia. The previous trends, current situation, main features as well as challenges of the emigration abroad from Slovenia, Croatia, Bosnia & Herzegovina, Montenegro, North Macedonia and Serbia are analysed. In the research available data of the State Statistical Offices of these countries and foreign data sources are used. Atlas of Migration data 2022 show that all these countries are faced with increased emigration abroad. According the stock data for 2020 the total number of emigrants from Bosnia & Herzegovina amounts 1691 thousands, that is 51.7% of the total population of the country. In other former Yugoslav countries this data amounts: Montenegro 133 thousands and 21.3%; North Macedonia 892 thousands and 48.6%; Serbia 1004 thousands and 13.7% respectively. Croatia and Slovenia are also faced with emigration, but it is offset by immigration. The annual flows for 2020 show that the number of immigrants in Croatia is 33 thousand, while the number of emigrants is 34 thousand. In Slovenia, the number of immigrants (36 thousand) is twice that of emigrants (18 thousand). In terms of international migration, the countries of the former Yugoslavia are faced with different challenges. Bosnia and Herzegovina, Montenegro, North Macedonia and Serbia are faced with emigration, which, depending on the intensity, causes a greater or lesser shortage of human resources, which can hardly be compensated by appropriate labour force from abroad. At the same time, Croatia and Slovenia are

in a different position and easily provide the necessary workforce, mainly from other former Yugoslav countries.

Keywords: Emigration abroad, Emigration rate, Immigrants, Emigrants, First residence permits

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https://doi.org/10.59954/PPYCDSP2024.5

Employment, Gender Equality and Family Policies: A Comparative Analysis of Post-Yugoslav Countries and the European Union

The gender perspective of economic activity implies the observation and explanation of differences between women and men. According to feminist literature, gender economic differences are a result of cultural norms that shape the asymmetrical division of gender roles in the private sphere. On the one hand, part-time employment is a form that has contributed to economic activity and women's employment, but on the other hand, it is more common among women and therefore contributes to the gender pay gap. Besides, the gender-specific nature of temporary contract employment shows that employment uncertainty is more prevalent among women. We explore the employment of young and middle-aged women in some post-Yugoslav countries, using LFS indicators from the Eurostat database, in a comparative perspective. Over the last ten years, Slovenia has consistently ranked among the countries with a high rate of economic activity for women aged 25–54. In 2022, the rate is the highest in Europe, reaching 90.5%. Additionally, the employment of women aged 20–49 who had children under the age of six is one of the highest in Europe. In 2021, the rate was 82.7%, which is 12 percentage points lower than men, marking one of the lowest gender gaps in the EU. In Croatia and Serbia, the rates are lower, and gender disparities are greater compared to Slovenia. However, these disadvantages are particularly pronounced in Serbia, where economic activity is over 10 pp lower and employment is almost 20 pp lower than in Slovenia. Although part-time employment is more common in Slovenia than in the other two post-Yugoslav countries, the percentages are significantly lower than the EU(27) average. In Slovenia, part-time employment was present in 11.5% of employed women aged 20–49 who had one child under the age of six, in 19.7% who had two, and in 25.7% who had three children of this age. In Croatia and Serbia, the percentages were almost 5 to 7% for women who had one or two children and between 11 to 12% for those who had three children under the age of six. Regarding temporary contracts, the percentage of employed women aged 25–54 years is lower in Slovenia (in 2021 – 9.1%) than in EU(27) (11.6%).

Temporary contract employment is more prevalent in Serbia (19.0%) compared to Croatia (13.0%). This topic is important due to the issues of gender equality and family policies aimed at optimal conditions for decisions regarding parenthood and childbirth. The high employment rate of women in Slovenia and the relatively less prevalent part-time employment suggest the need for work-family reconciliation policies that support the full-time employment of both parents. In the other two post-Yugoslav countries, there is a need to boost the economic activity and employment of young and middle-aged women, as well as decrease temporary employment. Less favourable indicators are more pronounced in Serbia than in Croatia. The achievement of gender equality implies not only equality in employment but also the absence of gender-specific forms of employment that contribute to gender economic inequality.

Keywords: gender equality, women's employment, part-time employment, temporary contract employment, work-family reconciliation

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(Dis)similarities between the urban systems of the former Yugoslav republics

National urban systems are dynamic and subject to constant change, which can be the result of spontaneous development or planned action, while major changes can be caused by changes in administrative boundaries. The observation of the past and present state of the urban system and the search for deviations from certain regularities in terms of population size of the cities within the urban system and their causes are necessary for planning the future organisation of the settlement network in each country. Polarisation, which is expressed in the pronounced population dominance of the capital, is a key feature of urban systems in all former Yugoslav republics, with slight differences in scale. Today's state is mainly the result of an intensive urbanisation process in the second half of the 20th century and the creation of new administrative borders after the collapse of the Socialist Federal Republic of Yugoslavia. However, certain dissimilarities in later development could allow interesting conclusions to be drawn about different developmental factors and causal relationships. Against this background, the current hierarchy (vertical dimension), the spatial (horizontal) dimensions and the development of the urban systems of the former Yugoslav republics were analysed in order to assess possible development trends in the future. Prominent approaches for researching and modelling urban systems were used within the study, in particular the Rank-size Rule and the Law of the Primate City. The study is based on available data, including previous and recent censuses (with the exception of Montenegro and Bosnia and Herzegovina for the most recent).

Keywords: Urban system, Rank-size Rule, Yugoslavia, polarisation

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Reflections on the Past and Future of the ICPD Programme of Action in the UNECE Region

In 1994, the International Conference on Population and Development (ICPD) in Cairo In 1994, the International Conference on Population and Development (ICPD) in Cairo produced the groundbreaking Programme of Action, adopted by 179 nations. This pivotal document highlighted the interconnectedness of population, development, and individual well-being. Emphasizing environmental sustainability, women's empowerment, and gender equality, it expanded the scope of family planning to encompass sexual and reproductive health and rights. Additionally, the Programme of Action went beyond a limited economic understanding of development, extending its scope to include the well-being and quality of life for both current and future generations. The United Nations subsequently incorporated many Programme of Action goals into the 2030 Agenda for Sustainable Development. The United Nations Commission on Population and Development is now reviewing the five-year implementation of the Programme of Action, with a new assessment slated for its thirtieth anniversary next year. The recent UNECE Regional Conference in Geneva, titled Population and Development: Ensuring Rights and Choices, played a crucial role in this process, providing insights into the Programme of Action's implementation in the broader European region. While overall improvements were noted, challenges persist, particularly in education, health, and the protection of vulnerable groups. Progress is still uneven across and within countries, adding complexity to the implementation landscape. Concerningly, multiple forms of inequality and discrimination continue to hinder individuals from realizing their full potential. The Regional Conference Report not only identifies these challenges but also offers proactive recommendations. Addressing declining fertility rates, an aging population, and demographic shifts in Eastern and South-Eastern Europe, the report stresses the need for innovative approaches to bolster societies' demographic resilience. Investing in human capital, dismantling barriers to unleash individual potential, and fostering inclusive societies are key strategies. The report emphasizes the importance of listening to people's needs and desires, presenting various good practices as

examples. These recommendations hold significant relevance for policymakers in post-Yugoslav countries and beyond.

Keywords: International Conference on Population and Development, Programme of Action, UNECE Region, public policy

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GUIDE pilot survey on child well-being in five European countries

Growing Up In Digital Europe (GUIDE) will be Europe's first comparative birth cohort study of children's and young people's wellbeing. The aim of the GUIDE study is to track children's personal wellbeing and development, in combination with key indicators of children's homes, neighbourhoods, and schools, across Europe. GUIDE will be an accelerated cohort survey including a sample of infants as well as a sample of school age children. One of the principal tasks in the preparatory stage of the survey has been to implement the GUIDE Pilot Survey, a large-scale cohort pilot survey using a harmonised instrument and research design in five European countries: Croatia, Finland, France, Ireland and Slovenia. Three groups of respondents were interviewed, with a separate questionnaire for each group: 1) 8-year-old children, 2) parents of 8-year olds, 3) parents of newborn children. There were around 750 respondents per country, that is 250 respondents for each questionnaire in each country. Survey agencies used a variety of sampling and recruitment strategies. Whereas in Finland the survey took place in the CAVI (Computer-Assisted Voice Interviewing) mode, face-to-face interviews were implemented in the other four countries. The surveys took place between spring and early autumn 2023. The surveys have been successfully implemented in all five countries. An examination of survey responses, evaluation questions, and insights from survey agencies collectively assures us that the questionnaire content is mainly adequate and serves as a very good basis in the preparations of Wave 1 of the GUIDE survey. However, the insights obtained from our five pilot surveys offer valuable reflections on potential improvements for the design of forthcoming national surveys. The pilots shed light on the impact of recruitment methods, revealing increased complexity in survey implementation in settings where recruitment transpires in public spaces. Also, the positive influence of financial incentives on response rates and respondent satisfaction, crucial in the longitudinal context of our project, emerged as a noteworthy finding. The consideration of Computer-Assisted Voice Interviewing (CAVI) as a viable alternative to Computer-Assisted Personal Interviewing (CAPI), particularly for hard-to-reach populations,

deserves serious attention. Finally, the pilot experience emphasizes the importance of providing interviewers with enhanced training, especially when engaging with child respondents. The lessons drawn from our pilot surveys also extend to considerations regarding the content of our questionnaires. While the fundamental structure of the questionnaire will not undergo substantial changes, thoughtful modifications are to be considered. A notable aspect pertains to the use of 5-scale answers in child questionnaires, where indications suggest potential challenges for some children. Also related to children's comprehension of questions, a discussion is needed around the inclusion of the so-called existential questions (such as those probing the meaning of life or optimism) when interviewing 8-year-olds, prompting reflection on whether these questions are best reserved for an older age group.

Keywords: well-being, child well-being, birth cohort, survey, pilot survey

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Demographic perspective of Bosnia and Herzegovina

Bosnia and Herzegovina is in an unfavourable period of demographic development, in which the number of inhabitants is constantly decreasing. Demographic trends are similar to those of neighbouring countries and are characterized by a decreasing number of children born, an increase in mortality, intensive aging of the population and constant emigration, mostly of the young and reproductive population. Between the two censuses, from 1991 to 2013, the population decreased by approximately 20%. Bosnia and Herzegovina has been affected by natural depopulation for fifteen years. Since 2007, this depopulation has manifested itself in negative natural growth, which is a consequence of a decrease in the birth rate and a constant increase in the mortality rate. The bad demographic picture is additionally damaged by the negative migration balance, so the total depopulation has large proportions. Currently, about half of the population born in this country lives abroad, and according to some estimates, about 0.7% of the population moves out of BiH every year. Migrations cause uneven distribution of the population, which leads to the demographic growth of cities and marked depopulation of villages. Significant spatial and demographic polarization and unequal population distribution hinder coordinated regional development and functional spatial sustainability. The decrease in the number of inhabitants is accompanied with the abandonment of certain geographical areas below the threshold of rational costs of providing services, which creates a negative spiral of insufficient development and the continuation of the decline in the number of inhabitants. All population projections indicate that further population decline in BiH is an unstoppable process. The consequences of that process are far-reaching. Population decline means a reduction in the human capital needed for development. Based on the projected period until 2050, it could be concluded that Bosnia and Herzegovina will have negative demographic consequences, which will create multiple challenges for society.

Keywords: demographic development, depopulation, Bosnia and Herzegovina

SESSION 2

POPULATION DYNAMICS

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Patterns of female and male fertility in Serbia based on the results of the 2022 Census

The decades-long low fertility of the population of Serbia is one of the biggest social challenges and a key component of population dynamics in the long term. Recent research suggests that the reduced progression to first and second child poses an increasingly significant challenge to the recovery of the total fertility rate despite the widespread perception that this is a reduction in higher child parity. At the same time, the pronounced gender imbalance in the spatial distribution of the population in their prime reproductive ages accelerates the processes of population aging and poverty in Serbia, despite the policy makers' goals presented through key national strategies regarding the country's sustainable development. Demographic analyses of changes in fertility patterns of the population in Serbia typically refer to females. Limiting the collection and interpretation of fertility data to women may lead to ignoring the specifics of men's reproductive behaviour, or to the assumption that the level, patterns, and changes in fertility do not differ significantly between men and women. The results of the 2022 Census in Serbia for the first time provide an opportunity to assess male fertility and perform a gender-sensitive analysis of fertility patterns. Existing research suggests that male fertility in Europe, especially in Eastern Europe, is lower than female fertility in recent periods, and that male fertility has declined faster than female fertility. Although the analysis of the results of the 2022 Census cannot conclude how this pattern has changed over time in Serbia, it will be very important to determine, from the aspect of pronounced differences in demographic capacities between areas and regions of Serbia that affect the demographic resilience of the country, what (dis)similarities exist between female and male fertility patterns, especially in their spatial distribution and settlement type. The aim of the paper is to identify patterns, correlations and trends in the fertility of the population of Serbia using statistical methods of longitudinal analysis of cohort fertility indicators of men and women

– cumulative and specific according to age, birth order of the child, marital status, education and type of settlement based on the special processing of the 2022 Census data. The results will show whether current generations in reproductive age reach, exceed or fall behind the fertility level of previous generations. Also, by comparing these results with those of the 2011 Census, it will be possible to determine whether there have been changes in female fertility patterns in the intercensal period regarding relations between frequency of births, number of live births and mean age of women at birth of first child. The results of the analysis will contribute to a better understanding of the reproductive patterns of the population in Serbia, thus possibly helping in creation of more adequate policy measures in the field of family planning.

Keywords: Female and male fertility, Census 2022, cohort analysis

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The Role of Educational Expansion in the Rise of Non-marital Childbearing in Croatia: A Decomposition Analysis

Research shows that individuals with lower educational attainment are more likely to have children outside marriage. However, as rates of non-marital childbearing have risen at the population level, they have coincided with expansions in education. Studies suggest that while the low-educated continue to have the highest proportion of births outside marriage, their declining numbers restrain their contribution to the observed growth in non-marital childbearing. Against this backdrop, our study delves into non-marital childbearing among first-time parents in Croatia, aiming to answer the following question: What portion of the rise in non-marital childbearing can be attributed to shifts in the educational composition of first-time mothers and fathers, as opposed to changes in education-specific rates? Drawing on vital statistics data from the mid-1980s onward, we examine the proportion of first children born outside marriage across low, medium, and high educational strata. Applying a decomposition analysis, we scrutinise the components of the overall increase in non-marital childbearing over four successive periods: pre-1990, 1990s, 2000s, and post-2010. Our findings, in line with broader trends, reveal an upward trajectory in non-marital childbearing across all educational groups. The most notable contribution to the overall rise in non-marital childbearing stems from rate changes among the medium-educated. On the whole, increases in education-specific rates fully explain the rise of non-marital childbearing among first-time parents in Croatia; the total compositional effect is found to work in the opposite direction. This indicates that the increase in non-marital childbearing resulting from behavioural changes was to an extent counteracted by educational expansion. The paper advances our understanding of the relationship between education and non-marital childbearing by providing context-specific information from Croatia.

Keywords: non-marital childbearing, educational expansion, decomposition analysis, Croatia

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https://doi.org/10.59954/PPYCDSP2024.12

Birth rates in post-socialist Serbia, Slovenia and North Macedonia – spatial differentiation and recent trends

This research paper focuses on the temporal and spatial variations of birth rates in Serbia, Slovenia, and North Macedonia from 2000 to 2022. One of the main objectives is to identify the factors that have led to differences among these three former Yugoslav republics, taking into account their specific demographic characteristics, levels of economic development after the dissolution of the Socialist Federal Republic of Yugoslavia, and the influence of historical events on demographic processes. National-level data and data at the NUTS 3 statistical regional level were used to accurately capture regional disparities within each country. Data from population censuses conducted by national statistical institutes, as well as Eurostat data, serve as the basis for the analysis of these processes. To provide a comprehensive understanding of the demographic landscape in the region, a range of factors were considered. Factors such as inherited demographic conditions, migrations, economic influences, population policy measures, and the impacts of war events in the former Yugoslavia are of crucial importance for a deeper understanding of the complex dynamics of shaping long-term birth rate trends in the region. The research pays special attention to spatial differences in terms of heterogeneity in birth rates both between the countries and within each country at the regional level. Furthermore, the study examines the dynamics of the demographic transition process in the previously mentioned countries. The selection of Serbia, Slovenia, and North Macedonia for this research is motivated by their specific demographic characteristics and varying levels of economic development following the breakup of the Socialist Federal Republic of Yugoslavia. By focusing on these three countries, the study tends to contribute to a deeper understanding of the interplay between demographic trends, economic factors, and socio-historical context in the region.

Keywords: Birth rates, Serbia, Slovenia, North Macedonia, regional differentiation

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https://doi.org/10.59954/PPYCDSP2024.13

Estimating excess winter mortality in Serbia

Seasonal variations in mortality are well documented, indicating a higher death rate during the winter compared with other periods of the year. Despite the evidence that vulnerability to winter weather has decreased, a significant number of preventable deaths still occur during the colder period of the year. Assessment of measures for excess winter mortality (EWM) is important for the public health system and what may be improved, but also for policymakers and stakeholders in order to be informed about current as well as future mortality-related climate change issues. This paper explores trends in EWM in Serbia and examines the validity of the methods of estimating EWM using monthly mortality data for the period 2000–2021. In order to estimate excess death using different measures, three methods were applied. First method (M1) uses the winter period as December to March and compare with the average of the non-winter period (preceding: August-November and following: April-July); second method (M2) defines winter as December to March against summer months (preceding: August and September, and following: June and July); and the third method (M3) set six months from October to March as a winter against the six-month non-winter period (preceding: August and September, and following: April to July). All three methods confirmed a higher number of deaths during the winter, and highest excess winter mortality was observed using the M2. This method determines winter as a four-month period from December to March, which is arbitrary but also well recognized in literature and generally used by public health services. The summer period in M2 is also casual and adjusted to the latitude. The main disadvantage of M2 refers to excluding April, May, October, and November from the winter/summer ratio. Compared with M2, M3 gives slightly lower excess winter mortality, but this measure classifies months in two too-wide seasons. The first measure, M1, estimates the lowest number of excess deaths, but considering climate characteristics in Serbia, this method uses the most suitable approach to assess winter mortality.

Keywords: winter mortality, seasonality, measure, Serbia

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https://doi.org/10.59954/PPYCDSP2024.14

Correlates of Premature Mortality in Serbia

This study investigates the relationship between premature mortality and various indicators of economic and social development among municipalities of Serbia. I explore how different indicators, especially those linked to economic factors, correlate with indicators of premature mortality rates in Serbia. I conducted a comprehensive correlational analysis using vital statistics, mortality data, and data from the Social Inclusion and Poverty Reduction Unit of the Republic of Serbia and other sources. Key social and economic development indicators were selected, such as social cash benefits and air pollution indicators, such as average annual PM2.5 levels. I employed a nonparametric approach to rank correlation, ensuring robustness in the face of potential data distortions. The study primarily focused on standardized rates of potential life years lost and different aspects of avoidable mortality rates (amenable and preventable). My findings revealed surprising patterns. While there was a strong correlation between various forms of premature mortality and the indicators of socioeconomic development, no significant correlation was found between premature mortality and net wage levels in Serbia. A slight negative correlation was observed between the median age of potential life years lost and net wages. The most significant correlation was found between the standardized rate of premature mortality and the percentage of social cash benefits recipients, indicating poverty as a key predictor of premature mortality in Serbia. Additionally, the study discovered unique patterns in premature mortality due to SARS-CoV-2, revealing a negative correlation with typical mortality determinants and a positive correlation with the number of doctors per 1,000 inhabitants. This study highlights poverty as the primary predictor of premature mortality in Serbia, challenging previous assumptions that primarily linked such mortality to economic indicators like net wages. The findings suggest a critical need for a renewed strategic approach to healthcare and poverty reduction, aligning with current health and demographic realities. While the healthcare system shows comparable staffing levels to economically better-positioned countries, it falls short in terms of modern equipment, organization, and specialist availability, notably in the context of the SARS-CoV-2 pandemic. This disparity underscores the urgent need for healthcare

infrastructure and training investment, emphasizing primary and secondary prevention strategies. The study also calls attention to the complex interplay between socioeconomic factors and health outcomes, providing a nuanced understanding that can inform future public health policies and interventions in Serbia.

Keywords: Premature mortality, COVID-19, air pollution, public health

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What could have been – comparison of age and sex standardization of mortality in Slovenia and Serbia

The average age in Slovenia and Serbia has risen over the last two decades from around 40 years in 2002 to exactly the same value for both countries in 2022 (43.8 years). While some drivers of aging population in Slovenia and Serbia are similar (low fertility and inertia of the baby boom generation), Slovenia attracts migrants and has longer life expectancy. As the coronavirus pandemic has become a serious burden worldwide, excess mortality due to Covid-19 and various diseases become prominently important factor for age structure in both countries. The paper explores the importance of age structure composition as an (unfortunate) precondition for higher mortality in 2020 and 2021 in Serbia and Slovenia and compares the demographic "price" of different mortality patterns. As a method, we use the standardization of mortality data at different points in time in order to show the difference between the experienced mortality level and the expected rates. The methodological procedure is to hold constant age and sex specific mortality rates in 2020 and 2021 and apply them to the age structure in 2002, 2005, 2010 and 2015. We chose both 2020 and 2021 because the mortality rate in Slovenia was highest in 2020 at 11.4‰ and then fell to 11‰ in 2021 and 10.6‰ in 2022. In Serbia, on the other hand, the mortality crisis was more severe, as the mortality rate in 2020–2021–2022 was 16.9‰-19.9‰-16.4‰. The results of our study indicate that the mortality rates in both Slovenia and Serbia would be significantly lower if Covid-19 had hit the younger population. In Slovenia, if the 2020 pandemic happened to the 2002 population, it would cost 7 lives per 1000 inhabitants, 7.5 in 2005, 8.7 in 2010 and 10.1 in 2015. In Serbia, if the 2021 happened to the population in 2002, the mortality rate would be 13.9 per 1000, 14.9 (2005), 16.9 (2010) and 18.5 in 2015. The differential mortality patterns also highlight that the male population was subject to higher mortality than the female population. Since Covid-19 was an unexpected challenge that left a clear but uneven mark on both Slovenian and Serbian society, the comparison of the mortality burden for Serbia can be of

practical importance, as various conclusions and recommendations can be drawn from Slovenian experience.

Keywords: mortality, age structure, standardization, population aging

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https://doi.org/10.59954/PPYCDSP2024.16

Spatial differentiation of human mortality in the Republic of Srpska

Over the past two decades, the Republic of Srpska has experienced a continuous rise in the overall mortality rate among its population. The primary determinant of mortality growth is the process of demographic aging and the increase in the share of the elderly population in the total population of the Republic of Srpska. This research aims to point out spatial and regional differences in population mortality based on gender, age and cause of death. Regional differentiation was performed using cluster analysis, based on the non-hierarchical k-means clustering method. The surge in the death rate, particularly in 2020 and 2021, underscores the substantial impact of the COVID-19 pandemic. The obtained results indicate marked differences in mortality between individual municipalities and regions, given that higher mortality rates are recorded in smaller local communities. The regions of Banja Luka and Bijeljina have more favourable trends in terms of mortality compared to the rest of the Republic of Srpska. Extremely negative characteristics were registered in almost all small and dwarf municipalities, such as East Mostar, East Drvar, Kupres, etc. The variation in mortality rates between genders implies a greater mortality rate among men across all local communities. Additionally, the age-specific mortality pattern highlights an elevated mortality rate among older segments of the population, contributing notably to changes in life expectancy. The prevalent causes of death primarily involve diseases of the circulatory system and neoplasms, both exhibiting elevated mortality rates. Such spatial analyses can be of great importance in the creation of public policies at the local, regional, and national levels.

Keywords: Mortality, Regional differentiation, the Republic of Srpska

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International student population in Serbia across time and space*

The international mobility of students in tertiary education has increased significantly over the last few decades globally. A highly educated workforce with international educational experience is an important element of societal progress. Students are specific migrant group that are migrating in order to improve their human capital at certain stage of the life course. General patterns of social transformation linked with international education call up for more research and a better understanding of the internationalisation of education. Until the 1990s, Serbia had a long tradition of educating scholarship holders abroad, as well as international students at domestic universities that renewed in the 2000s. However, despite the growing importance of international students for societies of origin and destination and the aforementioned tradition, this is an underexplored topic in Serbia. This article uses additionally processed 2011 and 2022 Census data in Serbia on international students studying in our country, who according to the definition of the censuses are included in the total population. Students from the former Yugoslav republics who are studying in Serbia were analysed independently. Descriptive statistical analysis was used for data processing in order to present and highlight selected characteristics of international students in Serbia from a time-space perspective. The new 2022 Census international student population data show how this migrant population subgroup has changed over the last decade. Besides the ambition that our findings shed light on new insights regarding this migrant population, the intention is to contribute to this under-researched topic within the demographic and sociological literature in Serbia. Quantitative empirical research aimed at mapping this population in Serbia is conducted as starting part of the scientific project IS-MIGaIN, where mixed method research will be applied aiming to broaden the scientific understanding of international student migration and identity nexus in the context of traditionally emigration countries, such as Serbia.

Keywords: International education, Migration, Students, Quantitative analysis, Serbia

** This research was supported by the Science Fund of the Republic of Serbia, GRANT No 1434, IS-MIGaIN. This paper was written as part of the 2024 Research Program of the Institute of Social Sciences with the support by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia.*

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https://doi.org/10.59954/PPYCDSP2024.18

The impact of social mobility on the (re)construction of identity among international students – case study of Serbia*

The presentation starts from the assumption of variability in the perception of personal identity in terms of its constant reconstruction and reshaping under the influence of different social environments with which individuals have interactions. Besides this, it assumes the subsistence of an identity core established during primary socialization. From the perspective of identity change, migrant populations are highly attractive due to the inevitable shift in social context. International students stand out specifically due to their interactions with peers from diverse cultures on campuses and universities where they reside, implying engagement with a multicultural social environment. In the investigation of the reconstruction of identity among international students in this presentation, special emphasis is placed on the influence of their vertical social mobility on the perception and reshaping of identity, as well as on their attitudes toward national identity. The analysis utilizes empirical material collected during 2023 and 2024. Data collection methods involve qualitative approaches (focus groups held in Belgrade and Novi Sad) and quantitative methods, including an online questionnaire conducted among the population of students from Serbia studying abroad or who have returned from education outside Serbia. Social mobility is operationalized through questions regarding the education and occupation of parents, while the perception of identity change is operationalized using questions about their self-assessment of the impact of another environment on the formation of their identity. Preliminary results indicate that the influence of the environment, as well as the sense of progress on the social ladder, significantly impacts the attitude towards identity following the experience of migration. Additionally, it is assumed that a higher degree of mobility also influences a greater disparity in the experience of identity before and after migration, in terms of the need to suppress identity core. The research was conducted as part of the IS-MIGaIN project (International Student Migration in the Serbian Context and (re)construction of Identity: Main Issues and Inputs for policy-making), funded by the Republic of Serbia's Science Fund.

Keywords: Identity, vertical social mobility, international students, mobility, social context

** This research was supported by the Science Fund of the Republic of Serbia, GRANT No 1434, IS-MIGaIN. This paper was written as part of the 2024 Research Program of the Institute of Social Sciences with the support by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia.*

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Population Dynamics under Environmental Challenges in Serbia

One of the biggest challenges Serbia is facing is demographic in its nature, and it stems from negative trends in population dynamics in the past several decades. Estimates suggest that the Serbian population has decreased by more than 600 000 in the last decade due to a negative natural and migration balance. Apart from socioeconomic and cultural-psychological factors that shape the demographic changes, it is reasonable to assume that population dynamics beings are affected by climate change, especially in terms of rising average temperatures which cause the appearance of various climatic and weather extremes, as well as by air pollution. Such environmental challenges act through socioeconomic mechanisms, such as changes in livelihoods, agricultural production, land use, economic conditions, health, quality of life and wellbeing. Proposed work will be the first study in Serbia that seeks to explain how and through which mechanisms environmental challenges influence the three components of population dynamics – fertility, mortality and migration, and, in accordance with this knowledge, to create population projections (scenarios) that consider the impact of environmental changes. The innovativeness of the methodological approach lies in the use and combination of demographic, socioeconomic and environmental data from different sources at the individual, regional and national level. In order to examine causal pathways, we will use Structural Equation Modelling (SEM), which allows to distinguish between direct and indirect effects of environmental challenges on population dynamics. Results will help to environmentally-wise identify the most sensitive area and demographic groups, which is important for public policy planning in the long run. If environmental challenges indeed influence fertility, mortality and migration, the population forecast and population policy have to be adjusted to the climate and pollution feedback.

Keywords: population changes, natural hazards, Serbia, Structural Equation Modeling

SESSION 3

ETHNIC STRUCTURE

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Croats in Serbia and Serbs in Croatia: demographic similarities and differences – selected aspects

The subject of research in this paper are the populations in the population censuses of declared Croats in the Republic of Serbia and Serbs in the Republic of Croatia in the time period 2001/2002. – 2021/2022 years. The purpose of the research is to determine the reached level of similarities and differences in selected dynamic and structural demographic indicators between these two minority communities, as well as in their relation to the total and majority population of the Republic of Croatia and the Republic of Serbia, with the aim of assessing their demographic sustainability in the future. The research is based on the official results of general population censuses held in Croatia in 2001, 2011 and 2021, and in Serbia in 2002, 2011 and 2022. The descriptive and comparative method will be applied in the research, and the results will be presented in aggregated analytical tables and graphs. The mentioned subject will be observed in the general dynamic demographic framework, which for both countries and for both minority populations is extremely depopulated, which means extremely unfavourable. Thus, without going into the issue of obvious changes in census methodologies, in the period 2001–2021 the number of the total population of Croatia was reduced by 12.7%, and the number of the total population of Serbia in the period 2002–2022 was reduced by 11.3 %. At the same time, the number of declared Croats in Serbia decreased by 44.6%, while the number of declared Serbs in Croatia decreased by 38.6%. Consequently, the relative share of Croats in Serbia decreased from 0.9% to 0.6% (by 0.3 percentage points), and of Serbs in Croatia from 4.5% to 3.2% (by 1.3 percentage points). In addition to the negative demographic dynamics of both populations (both minority and total), the observed period is also characterized by unfavourable processes in the formation of partial demographic structures, especially biological (age and gender), which, thanks to the accelerated aging of the population, is increasingly becoming a limiting factor in their long-term demographic sustainability.

Keywords: Croats, Serbs, Croatia, Serbia, demographic similarities, demographic differences

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Evolution of the national population structure of Montenegro from the Yugoslav period to the present day

This paper deals with the spatiotemporal changes in the national structure of Montenegro, emphasizing the shifts in the national composition during the former Yugoslavia and the period following its dissolution and the restoration of independence. Using various demographic and social indicators, demographic changes and their impact on national identification are investigated across different time periods. In the first part of the paper, the national composition of Montenegro during the time of Yugoslavia is examined, considering it as the smallest of its six republics. The focus is on exploring the ethnic dynamics, socio-cultural factors, and political influences that shaped the identity of the population during that period. The second part of the paper addresses the changes in the national composition after 2006, when Montenegro became an independent state, along with the factors that influenced these changes. Through a comparative analysis of data and the identification of key trends, the paper provides a deeper insight into the dynamics of changes in the national population structure of Montenegro. Analysing census data from 1948 to 2011, drastic changes in the national composition are observed, primarily concerning the number of Montenegrins. The number of people identifying ethnically as Montenegrins decreased significantly from decade to decade, dropping from 82% in the 1961 census to 45% in the census conducted in 2011. Some studies predict that this percentage will be even lower in the upcoming census, which has garnered significant attention in Montenegro due to its postponement and politicization. The paper also presents the distribution of dominant ethnic groups by municipalities, revealing additional factors such as regional influences that have impacted the national composition of specific areas. The goal of the paper is a deeper understanding of the evolution of Montenegro's national identities and its implications for social cohesion. It also aims to inform future policies that support inclusivity and multi-ethnic harmony.

Keywords: Montenegro, Yugoslavia, national structure, changes

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Assessment of the subjective experience of quality of life in Croatian-Roma settlements in Međimurje County (Croatia)

The paper analyses the results of a conducted survey on the subjective experience of the quality of life among the Croatian population in selected Croatian-Roma settlements in the demographically most populated Croatian county. The research aims to identify the factors that most significantly impact the quality of life of the majority population in these mixed settlements, in order to define specific guidelines for improving living conditions in Croatian-Roma communities. The methodology involves the application of a bottom-up approach and a questionnaire divided into seven sections: social relations, neighbourhood safety, exposure to crime, spatial segregation, natural environment, overall satisfaction with the quality of life, and socio-economic characteristics of the respondents. The collected data were processed using the SPSS 20.0 software with descriptive statistics and analysis of variance (ANOVA) method. The obtained results revealed that the lowest satisfaction with the quality of life is in the Pribislavec settlement due to pronounced crime and its negative impact on the natural environment. Spatial segregation was found to be present in all Croatian-Roma settlements, especially where the number of Roma population is higher. Respondents proposed a set of measures that could serve as guidelines for decision-makers.

Keywords: quality of life, Croatian-Roma settlements, Međimurje County

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Ethnic changes and challenges of preserving the regional identity of the Severnobačka region

Due to their location, border areas are often multi-ethnic. Numerous national minorities intertwine in them as a result of the long-term historical process of population settlement and migration, as well as political-territorial changes. Regional identities in border areas of states are manifested through the establishment of cross-border cooperation in the field of trade exchange, planning and construction of infrastructure facilities, tourism through the implementation of programs for the protection and management of natural and anthropogenic tourist values and daily migrations (pupils, students, employees). This paper aims to present the ethnic mosaic of the Severnobačka region in the context of presenting its regional identity as a reflection of the interweaving of the culture of national minorities. The paper presents the transformation of the ethnic structure of the population in the Severnobačka region, under the influence of contemporary demographic processes and political events in Serbia and neighbouring countries (conflicts in the territory of the former SFR Yugoslavia and the accession of Hungary and Croatia to the European Union). By applying the correlation method, key demographic changes were identified (fall in the total fertility rate, negative natural increase, negative migration balance), which were reflected in the ethnic composition of the population. A special motive of this research is the process of intensification of emigration of the population in the 21st century, especially those with dual citizenship, especially those countries that are members of the European Union. According to the results of the 2022 census, for the first time in Subotica the Serbian population is dominant, while at the level of the Severnobačka region, the ethnic structure is dominated by the Hungarian population. The tendency to decrease the numerical and percentage share of the most numerous national minorities (Hungarian and Croatian population) is especially pronounced in the 21st century. This is largely reflected in the changes in numerous features in this area: the linguistic and confessional structure of the population, traditions, cultural homogenization, and the gradual loss of the identity of those communities. The idea is to consider a key question:

Will the Severnobačka region preserve its multicultural character or is it on the way to ethnic homogenization?

Keywords: Emigration of the population, citizenship of the European Union, depopulation, identity

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Ethno-demographic characteristics of Serbs in the Croatian Danube region at the beginning of the 21st century

This scientific work studies the contemporary ethno-demographic characteristics of the Serbian community living in the Croatian Danube region, with specific emphasis on the area that is institutionally organized into the Joint Council of Municipalities. Compared to other Croatian regions affected by the war in the 1990s, where the Serbian population is autochthonous, the Croatian Danube Region was peacefully reintegrated into the Republic of Croatia in 1998 by the provisions of the Erdut Agreement from 1995. This kind of epilogue to the events of the war, the guarantee of political rights, cultural and educational autonomy and geographical location had a crucial impact on the demographic characteristics and position of Serbs in this part of Croatia. Through the analysis of demographic characteristics, such as number of inhabitants, migration and age structure of the population, the research focuses on the changes that took place in the first decades of the 21st century. For the purposes of the research, the data of all three population censuses conducted after the war and peaceful reintegration were used, whereby a comparison is made with the data from the pre-war year 1991. The research results show that Serbs in the Croatian Danube region, despite negative demographic trends and complex inter-ethnic relations, have significantly more favourable demographic characteristics and social position compared to the Serbian national minority at the state level. The analysis of demographic trends, related to socioeconomic factors, contributes to a better understanding of the challenges faced by the Serbian community in the Croatian Danube region and provides insight into its demographic sustainability and perspectives.

Keywords: Serbs, Danube Region, Croatia, ethnic structure, migrations

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Methodological questions in researching the mortality of statistically variable ethnic groups in Serbia

Questions of ethnic identity in multicultural societies are of particular importance today and are reflected in various ethnostatistical and ethnodemographic studies. In addition to the population census, an equally important source of data for ethnodemographic research is the vital statistics that has been recorded in Serbia since the first half of the 19th century, but the distribution of data by nationality has only been available since the 1950s. In the post-war period, vital statistics underwent methodological changes, particularly between 1965 and 1970, when the publication of vital events by nationality was suspended, making it difficult to study the demographics of those ethnic groups that experienced negative natural increase for the first time during this period. The second problem is related to the application of subjective criteria in the ethnic declaration of vital events, which directly causes a statistical discrepancy between the declared ethnic identity of the mother at birth and the statement of the death reporter of the same person. This phenomenon is especially pronounced in statistically variable (floating) ethnic groups whose population size fluctuates due to their frequent change of attitude when stating their own ethnic identity in official statistics. Therefore, in this paper we will focus on the study of the quality of ethnostatistical data of vital statistics using the example of a comparative analysis of selected mortality indicators according to the period 1970–2020 which directly influenced the pronounced fluctuations in the dynamics of the natural movement of certain ethnic groups. This will show whether vital statistics data can be accepted and used without restriction as a quantitative basis for demographic and other research.

Keywords: Vital statistics, floating ethnic groups, mortality, Serbia

SESSION 4

AGING AND HUMAN CAPITAL

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Active and healthy aging in Croatia: An example from the city of Zagreb

For the quality of life and satisfaction of older individuals, in addition to financial status and social inclusion, good health and preserved functional abilities are crucial. The way to achieve a better quality of life in old age is linked to the concepts of active and healthy aging. This approach enables individuals to participate in the workforce for a longer period and reduces the needs and costs that the growing older population places on the healthcare system and various social services. In promoting active and healthy aging, researchers emphasize the importance of a life cycle perspective, focusing on activities throughout one's life rather than just in old age. We will present findings from a qualitative research study on aging in place of individuals aged 65 and older living in the city of Zagreb. Interviews were conducted with a sample of 20 older residents of Zagreb from December 2022 to January 2023, covering various aspects of their lives both past and present, using a life cycle perspective. The aim was to assess the extent to which an active lifestyle during different life stages influences overall quality of life in old age. Results showed that a significant predictor of healthy and active aging is regular physical activity and an active lifestyle. Additionally, the preservation of various interests and plans (future-oriented thinking) and the (material and social) opportunities for their realization were confirmed as crucial for the personal satisfaction of older individuals living in their own homes. Alongside regular physical activity, being in any way involved in the community, maintaining a social network (relationships with family members, friendships, neighbourly relations, relationships with former colleagues), and participating in leisure activities while fulfilling daily obligations (self-care) were extremely important for older individuals. Active and healthy aging is the result of an active lifestyle, primarily physical activity, the prolonged preservation of independence, individual involvement in the community, and maintaining a broad range of interests in all aspects throughout one's life.

Keywords: Active and healthy ageing, Croatia, ageing in place

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What changes in the age composition of the Vojvodina population tell us?

The research focuses on the characteristics and transformation of the age structure in AP Vojvodina from 1948 to 2022, examining demographic trends and socio-geographic events to present and analyse changes in the region's age structure trends and characteristics. We analysed the population age structure found on the age pyramids and the calculation of the age indicators based on the Census data. Substantial changes are present in the young (0–14 years) and old (65 and over) populations, which have opposite trends. Since 2002, the number of inhabitants in Vojvodina has been decreasing, while the number of older adults is growing. In 2002, the proportion of the young population stood at 15.9%, mirroring closely the 15.5% share held by the older population. According to the last population Census, every fifth resident in Vojvodina is 65 years old or older. The young population in Vojvodina has been decreasing since the 1961 census. Trends in the category of the working-age population indicate the process of demographic ageing of the population of Vojvodina. These shifts in age group proportions have side effects on the region's demographic landscape and societal dynamics. The rising share of older adults signals the need for policies and support systems to cater to the needs of an ageing population, such as healthcare, pension plans, and elderly care services. The changing ratio of young individuals may impact education, family dynamics, and workforce planning. Comprehending these demographic patterns holds significant importance for policymakers and stakeholders, enabling them to respond to the shifting needs and complexities within the population of Vojvodina.

Keywords: age structure, population aging, Vojvodina

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The phenomenon of demographic aging in Serbia through the perspective of life in elderly households and (in)active aging

The aging of the population represents one of the dominant social processes that is intensifying at the beginning of the 21st century. Its ubiquity and implications, above all in economic and social segments of society, justify the creation of the concept of "aging society". Therefore, the goal of this paper is to review the achieved level of the aging process through the analysis of demographic indicators. Census data on the structure of households consisting of elderly people, whether single or multi-member households, was analysed to identify socially vulnerable categories that require organized and systemic support from society. The paper also deals with issues of active aging, measured by the relevant index of active aging, as well as issues of longevity and years spent in health, which are quantitatively described by indicators of life expectancy and healthy years of life. According to data in 2022 on the share of people over 64 in the total population, which is 22%, Serbia ranks among the oldest countries in Europe. More than two-thirds of municipalities in Serbia have a higher proportion of elderly people than the national average, and large regional differences are also observed. The data also show that almost every fifth household is an "elderly" household, that is, it consists only of old people. Elderly households are more represented in rural areas (23.9%) compared to urban areas (20.3%). Most elderly households are single (62.3%), and the most numerous are in Belgrade and Vojvodina and in urban areas (62.0%). Two-thirds of single elderly households are made up of women, and this share is higher in urban areas (72.4%) than in other settlements (63.5%). The economic activity of the elderly was analysed based on the Census data 2022. Most of them receive a pension as their main source of income (94.3%), only 1.8% of them are employed, while 1.5% of them declared that they do housework. From the perspective of active aging and additional income, there is a great need for some kind of engagement of these persons.

According to the latest available data on the Active Aging Index, in Serbia in 2018, a third of the elderly were active, and the most positive

performance was in caring for children and grandchildren. Active aging promotes the results and statistics of healthy years of life, which were 69 for women and 67 for men in 2019. This means that of the average life expectancy in 2019, 78 years for women and 73 for men, living in good health makes up 88% of the average life expectancy for women and 91% for men. The multiple implications of aging require an adequate state intervention in the creation of population and social policies. In the search for an answer to the growing problem of demographic aging, a new understanding of this process through active aging and prospective old age is introduced. The paper provides an overview of the state's response through the Strategy of Active and Healthy Aging in Serbia, but also through examples at the local level.

Keywords: Demographic aging, single and elderly households, active aging

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https://doi.org/10.59954/PPYCDSP2024.29

Modern changes of households in the Republic of North Macedonia

Households represent some kind of peculiar cells in human society, special socio-economic communities, and demographic cores in which everything connected to the population changes takes place, but at the same, they represent significant working units. In a special way, households build the basic component in the development of some particular area, mainly because their features represent crucial components in a lot of socio-geographical processes and have an influence on the development in general. From so far development can be predicted and estimated some other population elements, conditions for unfolding of certain economic and non-economic activities, planning future needs, and more. Therefore, knowing the condition of the households has versatile theoretical and practical importance. Data analysis shows that the number of households notes a continuous increase in all intercensal periods. From 2002 to 2021, opposite to the total population reduction, the number of households has increased by 34,336 or 6.08%. Nearly a third of the households in 2021 were concentrated in the Skopje region. Parallel to the increase in the number of households, the process of their weakening in terms of demographic potential is taking place because on average, 3.07 people are registered in one household. The constant decrease in their size comes as a result of following the modern demographic processes and transformations that are happening in the society and the family, not only in the country but globally as well. However, the modern changes in the household are visible in all their features. The main database for the needed analyses regarding households is the statistical one, i.e., the one from the conducted Censuses of the population, households, and dwellings. More precisely, data from the household questionnaires provide information on all household members, according

to the criteria on family connection with the head of the household. The paper aims to show the modern changes in households in the last inter-census period, the territorial specificities, with a special reference to households according to family composition and single-person households. Their territorial distribution and spatial differences which exist in terms of their size, offer information for a lot of segments in planning, organization, and use of space. Households are connected to the so-called planned needs from many aspects of human living: demand, consumption, residential needs, quality of living, use of natural-geographical resources, etc.

Keywords: households, single-person households, modern changes, North Macedonia

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https://doi.org/10.59954/PPYCDSP2024.30

Changes in the social status of the population in the post-Yugoslav period and the impact on housing in Belgrade

In the post-socialist period, there were many changes in the post-Yugoslav region. The dissolution of the state and the civil war were just some of the most important events. The successor states went through the post-socialist transition at a different pace. The political and economic transition had a significant impact on the social status of the population. According to numerous international urban studies, there is a causal relationship between the social status of the population and the housing situation. Looking at the social status of the population in Belgrade, it is obvious that the social status decreases from the centre to the periphery. The housing situation in Belgrade is very heterogeneous. First, there is a historical centre filled with buildings from different eras: from the pre-World War II period, from the socialist period and from the post-socialist period. Secondly, there are socialist neighbourhoods that surround the historic core of the city. Finally, there are the neighbourhoods on the periphery, which are mostly informally built. The withdrawal of the state and the reintroduction of market mechanisms in the housing sector, drastic proportions of owner-occupied housing, the expansion of illegal construction activity, international isolation during the 1990s and the subsequent reconnection to the global economy, albeit with extremely weakened institutions, characterised post-socialist housing and urban development in Belgrade. Added to this was another wave of demographic pressure from the former Yugoslav republics and Kosovo. Through the lens of social status and housing situation, we observe the patterns of residential segregation in the post-socialist period. Due to the incomparability of statistical data from different periods, we use a combination of sources and research approaches. The first two decades of the post-socialist period were analysed at the level of census units, using data on the education of the population as a proxy for their social status.

Keywords: Housing, social status, residential segregation, gentrification, Belgrade

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Value of people – human capital in Serbia with a special focus on educational attainment

Human capital is an important determinant of overall socio-economic development. In addition to economic parameters, human capital is significantly influenced by the level of formal and informal education attained. Previous research in this area has focused on formal education and the skills acquired in relation to better positioning in the labour market. Accordingly, the main objective of the conducted research is to determine the state and level of development of human capital in Serbia. This analysis is based on the set of indicators that represent the achieved level of education and then its utilization, measured by the index of human capital utilization. It is carried out for the territory of Serbia at the municipal level (168) with official statistical data (2022). In order to look at the demographic development through the prism of human capital, it was necessary to apply a multidimensional approach, referring in particular to the qualitative characteristics of the population. The results enabled the categorization of municipalities according to their human capital potential. In addition, the research results also provided an insight into the utilization of existing human capital, which sheds light on the mismatch between the education attainment and the labour market demand. It is obvious that most municipalities in Serbia are characterized by an insufficient educational attainment in general or in the local context. The research shows that it is crucial to change the general perception of demographic problems and challenges, not predominantly in relation to population size, but more in advancement of education and skills capacities. This will allow the development of applicable and more realistic public policies.

Keywords: human capital, education attainment, labour market, index of human capital utilization, Serbia

SESSION 5

NEW METHODOLOGICAL SOLUTIONS

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https://doi.org/10.59954/PPYCDSP2024.32

Census data corrections and intercensal estimates in Serbia for the period 2002–2022

Censuses in Serbia often introduce new methodological solutions, making it increasingly challenging to analyse population changes. Methodological differences in the results of the last three censuses (2002, 2011, and 2022) hinder accurate data comparisons and lead to significantly varied interpretations of census data. Assessing net migration in the inter-census period and generating annual postcensal estimates of the total population, which form the basis for calculating demographic indicators, rely on census-derived data. Annual population estimates can deviate significantly from actual values, particularly when the base year (census year) is distant. As a result, estimates for 2021 and 2022 differ by over 180 thousand due to being based on different censuses. Intercensal estimates have not been conducted in Serbia to date, but they can substantially impact the correction of demographic indicators, especially at lower territorial-administrative levels. Intercensal estimates refer to population estimates between two censuses and are deemed more precise than postcensal estimates as they approximate data between two specific points in time. Leveraging census results (2002, 2011, and 2022), vital events in the inter-census period, and internal migration data, annual population figures at the municipal level and the extent of external migration will be computed. These calculations will enable the estimation of population figures and total net migration for all higher territorial-administrative units, starting from the municipal level. Consequently, the fundamental demographic indicators for 2002–2022 will be reevaluated based on the acquired data. The outcomes are expected to reveal the extent to which population estimates were overstated in official reports due to the exclusion of external migration in their computation. This imprecision led to inaccuracies in basic demographic indicators. By rectifying the data, it is anticipated that death rates and fertility levels will slightly surpass the officially published values during the inter-census period. The data obtained from intercensal estimates should demonstrate how the migration component influences population fluctuations at the municipal level.

Keywords: Census data, intercensal estimates, net migration, demographic indicators, municipal level

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Demographic future of municipalities in Serbia through the lens of space-time pattern mining

The population changes at different spatial levels with varying velocities due to the influence of different factors. Serbia is a country of distinct spatial-demographic disparities, which have been shaped by various multi-decade political events on its wider territory. For more effective management of space, it is important to know not only the current situation but also the population change in the future, which population forecasting can assist with. This paper adopted a space-time pattern mining to identify the best population forecasting model in Serbia at the local level by 2036 for each year, based on annual population data from 1991 to 2021. Curve fit, Exponential smoothing, and Forest-based model were used to predict the population number for each time-step (year) at the municipal level. Following that, using Evaluating forecast by location, the best forecast population model for each municipality was identified. Finally, the population at the municipality level for the last time step, i.e., 2036 was cartographically presented. To obtain a more precise picture of future demographic trends, we singled out municipalities with a decreasing and increasing trend, as well as municipalities with no clearly expressed trend of population change, based on existing data on the number of inhabitants. Analyses were conducted in Version 3.0 of ArcGIS Pro. In relation to the analysis of available data (1991–2021), the municipalities with a trend of decreasing population are dominant. According to the estimated population by 2036, Serbia's multi-decade depopulation process is anticipated to continue. According to all three forecasts, Serbia will have less than six million inhabitants in 2036. A comparison of multiple forecasting models revealed that Exponential smoothing forecasting is the best fit for the majority of municipalities. This illustrates that most municipalities in Serbia display substantial repetitive patterns. By spatializing the forecasting models, a model that best predicts changes in the population number for each municipality was chosen. Thus, predicted data on population trends can serve local decision-makers to develop resource allocation strategies (construction of roads and other infrastructure, supply of food, energy, etc.) as well as optimal management at the local level.

Keywords: Population forecasting models, local level, space-time pattern mining, Serbia

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https://doi.org/10.59954/PPYCDSP2024.34

Migration Balance in Serbia: Age, Cohort and Period Analysis

Problem of international migration evidence and statistics in Serbia is well known by far. Migration balance is calculated for entire intercensal period by vital statistics method. Values gained in such a way aren't specified by age and generation, thus can be tracked only by period. In the other hand, mirror statistics doesn't provide much more than a crude migration balance estimation. In this article we will try to estimate migration balance by age and by cohort. Based on data on vital events and census data we will calculate migration balance, and all the indicators related to it. Analysis is covering the period from 1981. to 2022. and is related to the total population of Serbia. We will also analyse possible differences between generations and periods by statistical analysis. Such methodologically uncommon approach will give us valuable information about age-specific time-trends in migration of population in Serbia. Period effect should reveal are there any differences between pre-crisis (1981–1991) and post-crisis (2002–2022) period in the level of migration, cohort effect should reveal are there significant differences in international spatial mobility between generations, and, in the end, age effect should prove well known pattern of migration selectivity. Results should be applicable mostly in formulating assumptions about future migrations and theirs age-specific influence on total population of Serbia. Similar approach could be used for all lower territorial levels where data are available. Significance of knowing migration in detail is higher for demographic development in lower territorial units, so this procedure could find its application particularly in population projections of subnational level.

Keywords: Age-specific migration balance, cohort effect, period effect, population projections

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https://doi.org/10.59954/PPYCDSP2024.35

Internal migration in Serbia through the lens of spatial planning: data sources and possible methodological solutions

In the first two decades of the 21st century, Serbia faced a significant population decline (from 7.5 million to 6.65 million), which affected almost 95 per cent of all settlements and 90 per cent of local centres. Beside general depopulation and "urban shrinkage", unfavourable migration flows pose an additional challenge for spatial development. The spatial patterns of internal migration trace general socio-economic processes and thus represent one of the most important indicators of the diffusion of development within the territory. At the same time, internal migration flows represent a feedback loop for the increase of development disproportions. Considering that one of the main strategic objectives of spatial development in Serbia at all territorial levels (national, regional and local) is a more balanced distribution of the population, a broader and deeper insight into the extent and flows of internal migration can make an important contribution to spatial planning. Against this background, the study aims to identify various sources of statistical data and possible methodological solutions for conducting an analysis of internal migration in Serbia. The study utilises three different types of data provided by the Statistical Office of the Republic of Serbia, including: Population Census (migration characteristics of the population), Internal Migration statistics (immigration and emigration data based on changes of residence) and birth and death statistics (combined with population census data). The data used are partly published via the dissemination database and partly unpublished. The research results provide information on the advantages and disadvantages of using the above-mentioned data sources, e.g. data quality, availability, level of detail, etc. In addition, a comparative analysis carried out with all three data sources using specific examples revealed possible discrepancies in the results.

Keywords: Internal migration, Serbia, Data sources, Population dynamics, Spatial Planning

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https://doi.org/10.59954/PPYCDSP2024.36

Studying transnational families using quantitative methods: possible data sources in Serbia

Transnational families (TNF) are part of migration and mobility as ways of maintaining family relations across national borders. However, the research of this phenomenon has developed more significantly only in the last few decades, in the era of globalization, better traffic and information communication, and mostly with the increase of temporary and circular forms of migration and mobility in economically developed countries, which inevitably lead to geographically separate lives of members of the same family. TNF are mostly characterized by visible dynamics, in geographical, social, economic, psychological and other forms. It implies constant change, which is inevitably reflected in the possible approaches for the study of TNF. One of the challenges is the lack of agreed definitions. In most countries, a TNF definition does not exist. Therefore, it is not surprising that the vast majority of TNF research is based on topics that can be studied using qualitative methods.

However, over time, TNF members, especially in destination countries, have become important stakeholders about whom little is known, whether they are workers, students, refugees, among whom are a large number of minors. Also, family members, for example, parents, left behind in the origin countries, or retired foreign workers in destination countries, are placing increasing demands on the state funds for their care and well-being. Issues of social and health care and the rights of TNF members both in the countries of origin and destination are just some of the topics for which reliable and accessible data are necessary. These are also the main reasons why in economically developed countries approaches to the study of TNF using quantitative methods are increasingly being developed. Therefore, the aim of the paper is to consider the most important sources of data on TNF. Survey research stands out among them. On the example of Serbia, which at the same time faces emigration and immigration, as well as transit forced migration movements, the paper discusses the possibilities as well as challenges in the study of TNF using quantitative methods, as well as ways of developing data sources that can at least to some extent track and record their complex dynamics.

Keywords: transnational families, migration, mobility, data sources

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The possibility of using EHIS survey for the identification of sandwich generations

"Sandwich generation" is a term that denotes a generation whose members, at one stage of their life, take care of their descendants and their aging parents at the same time. The combination of the parental role and the informal care of elderly family members represents the squeeze of the life cycle, i.e. pressure from both younger and older family members, and has its own sociological, cultural, economic, demographic and numerous other dimensions. The goal of the research in this paper was to identify the "sandwich generation" in Serbia from a demographic perspective, using quantitative methods. In the absence of longitudinal and qualitative research, as the most reliable sources of data for the study of this social phenomenon, the examining whether the existing social statistics have data that can support research of this type, was the first step approaching the work. As the most suitable source of data, the European Health Interview Survey (EHIS) was chosen, which was carried out in 2019 in the organization of the Statistical Office of the Republic of Serbia and the Institute for Public Health "Dr Milan Jovanovic Batut". For the purposes of this work, a secondary analysis of data from EHIS was performed, and thus the research capacities of EHIS in this issue were examined and, at the same time, some methodological solutions were offered. The research was conducted on the basis of 975 cases from a sample of 13,178 respondents. The group of respondents was selected on the basis of questions about the provision of informal care, analysis of the structure of households to which they belong and the kinship relationship of household members, from which the parental role was also detected. Defining the demographic profile of this contingent of persons included determining the age-sex structure, marital and work status, level of education, but also the description of accompanying information – the frequency and duration of care provision. Statistical analysis of the data showed that a typical representative of the "sandwich generation" is a woman, aged 45–59, married, employed, with a medium level of education, and that she provides help to an older family member at least 10 hours a week.

Keywords: sandwich generation, Serbia, EHIS

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Spatial marginalization heterogeneity of bordering area in Republic of Croatia – GIS multicriteria decision analysis approach

The specific territorial shape and geographic position of the Republic of Croatia (RH) which is a result of dynamic historical-geographical development, has resulted in a very complex land border in a European comparative sense. The RH has a land border with Slovenia, Hungary, Serbia, Bosnia and Herzegovina (BiH), and Montenegro with a total length of over 2,300 km. Borders between the RH, BiH, Serbia, and Montenegro are at the same time state borders and the external border of the European Union (EU). In contemporary border studies, border areas are treated as national but also functional periphery, development margin and areas of pronounced polarization effect. The aim of this research is to determine whether the border areas of the RH fit into the classic centre-periphery development paradigm. Special emphasis of research is placed on the analysis of the spatial heterogeneity of the marginalization in the context of observing the RH borders with other EU members (Slovenia and Hungary) and with Serbia, BiH and Montenegro. In this paper, the GIS-Multicriteria Decision Analysis Method (MCDA) is used to derive the composite marginalization index (GMAR) in five classes (from 1 – extremely non marginalized to 5 – extremely marginalized areas). Due to pronounced processes of centralization driven by urbanization and economic transition, larger urban centres are singled out as non-marginalized (prosperous) areas, while moving away from them the degree of marginalization increases. Such a development pattern points to pronounced relations between the centre and the periphery, which are further deepened due to various factors of an historical, economic, demographic and functional nature. In general, bordering areas in the RH are classified as extremely marginalized and marginalized. The final GMAR model indicates the existence of spatial inequalities between areas near the EU borders and areas outside the EU borders. The latter are recognized as the most marginalized areas in the RH. Future research on the marginalization of border areas will also include qualitative research methods with the aim of increasing and verifying the accuracy of the model.

Keywords: Heterogeneity, marginalization, GIS-MCDA, bordering area

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Demographic diversity of Bosnia and Herzegovina: An integrated analysis of composite indicators at the municipal level

The contemporary demographic development of Bosnia and Herzegovina is a very active topic in academic, but also in wider political and public discourses, particularly in the context of increased depopulation trends. Distinctly negative processes in the natural change and net migration are the result of post-war and transitional circumstances, as well as the socio-economic status of the country. Demographic disparities conditioned by a complex social background (economic, social, political, cultural and environmental factors) are often the subject of geographic research in this area, however, few studies have resulted in a comprehensive demographic categorization of municipalities and cities in Bosnia and Herzegovina, which would be the first step in detection precise causes of demographic regression. Demographic categorization of municipalities on the basis of as many available demographic indicators as possible is a useful instrument in planning, through which concrete revitalization measures can be created primarily aimed at reducing polarization effects in development and depopulation of continuously deprived regions. This study used demographic data from the last 2013 population census, as well as those from more recent publications of national and entity statistical agencies. Special focus is placed on the index of total population change, population density, vital index, ageing coefficient and share of highly educated population. These indicators were analysed from the aspect of regional disparities, whereby special categories of municipalities and cities were created for each of them, in relation to how favourable is local demographic situation. In the second phase, their multi-criteria data integration was carried out, which more clearly indicate the general level of demographic development of individual municipalities/cities.

Keywords: Bosnia and Herzegovina, municipalities and cities, demographic categorization, depopulation, regional disparities

SESSION 6

REGIONAL APPROACH AND CASE STUDIES

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Regional differences in the natural population growth movement of Montenegro since the beginning of the 21st century

In the past 50 years, the population of Montenegro has undergone all phases of natural population movement, which is characteristic of accelerated demographic transition. In the early 1960s, birth rates were high, but after the 1970s, they shifted to moderate levels. At the beginning of this century, birth rates in Montenegro were at the upper limit of low levels. In contrast, mortality rates increased due to the aging of the population, transitioning from low to moderate levels. The moderate increase in mortality rates is also a normal consequence of population aging. The beginning of the 21st century was marked by inherited declining fertility rates from the end of the 20th century, with a tendency to decrease birth rates throughout Montenegro, but with pronounced regional differences. Essentially, behind the regional differences lie predominantly unequal regional development, influenced by factors such as tradition and religion. This has led to migration flows towards the capital and the Southern region. With the departure of young people, these areas are left without a demographic base for population reproduction, while, at the same time, the population potential of immigration municipalities increases. As a result of these movements, almost all municipalities in the Northern region have experienced low and negative natural population growth rates in the last 20 years, as have municipalities in the Central region, except for Podgorica. The situation in municipalities in the Southern region is somewhat different. The natural population movement in Montenegro has entered a phase where there is a need to focus on biodynamic rejuvenation, i.e., increasing birth rates if we want to avoid a situation similar to that faced by many European countries and our immediate surroundings, where negative natural population growth rates result in population decline. Adding to this fact is the emigration of a certain portion of the population beyond the state borders. It is clear that measures must be taken to increase natural population renewal.

Keywords: natural population growth, birth rate, mortality rate, fertility rate, Montenegro, regions

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https://doi.org/10.59954/PPYCDSP2024.41

Global challenge on a local scene – the urban reality of Serbia at the beginning of the 21st century

With more than half of the world's population living in cities, the 21st century is known as the urban century. However, in an urbanized world that goes hand in hand with a growing world population, a "silent" process of urban shrinkage has been taking place for some time. In the first decades after the Second World War, the decline of cities was initially limited to the old urbanized regions of the world. In the late 20th and early 21st century, it spread to developing countries and has become a global phenomenon. The Serbian urban population grew from the 1960s to the 1980s, while it stagnated in the 1990s. Complex spatial-demographic and socio-economic changes during the post-socialist transition have determined the demographic development of urban settlements in Serbia towards shrinkage. At the beginning of the 21st century, the urban population in Serbia has slightly increased, but the disproportions in population development between urban settlements have deepened, reinforcing the previously existing urban polarization. In the last decade a negative average annual rate of change of the urban population in Serbia was recorded. As a result, more than 80% of urban settlements in Serbia are affected by the process of urban shrinkage. Urban shrinkage is thus becoming a challenge at both global and local levels. The paper analyses the development of the total population in 167 urban settlements in Serbia in the period 1961–2022. The aim of paper is to determine the main urban trends in Serbia, focusing on the phenomenon of urban shrinkage.

Keywords: urban shrinkage, urban population, Serbia

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Application of cluster analysis in determining the development level of local self-government units in the region of Vojvodina

The concept of regional development is of increasing importance in modern geographical research since development differences are observed at different levels of administration. In Serbia, a highly centralized country, development opportunities have led to the drastic disparities at the national, intraregional and interregional levels. One of the basic objectives of regional development is the reduction of intraregional disparities, i.e. differences in the level of development of local self-government units (LSGUs) of a region. Hence, the paper focuses on determining the development level of Cities and municipalities in the region of Vojvodina. For this research, seven demographic and socio-economic indicators, generated from the publications of the Statistical Office of the Republic of Serbia (SORS), were included in the consideration. Non-hierarchical k-means cluster analysis, one of the most widely used statistical methods, was used as the basic method. In order to obtain more precise results, the used indicators were standardized using the Euclidean distance measure. All 45 LSGUs in Vojvodina region were divided into three clusters. The differentiation based on standardized indicator values was carried out and made into the most developed, medium developed and least developed LSGUs. The analysis covered the years 2011 and 2022, so a comparative method was applied to examine the change in the level of development of the selected territory. The results of the cluster analysis show that the territory of Vojvodina is characterized by the heterogeneous development of LSGUs during both selected years. However, the largest number of LSGUs belongs to the least developed cluster, which implies that balanced intraregional development of Vojvodina has not yet been achieved. It is important to emphasize that in the period 2011–2022, according to the selected indicators, there was a significant progress in four Cities: Vršac, Zrenjanin, Sremska Mitrovica and Subotica. The aforementioned four Cities, including also Novi Sad and Pančevo, which were belonged to the most developed cluster in 2011, represent Vojvodina's poles of development. Such data are not in accordance with the main principles of equal regional development.

The paper represents another drawing of the public's attention to unequal intraregional development and a contribution to the understanding of the given problem.

Keywords: Regional development, intraregional development, cluster analysis, local self-government units (LSGUs), Vojvodina region

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Economic dynamics in border municipalities of AP Vojvodina: perspective of regional development (2011–2022)

This research paper explores the economic dynamics of border municipalities in Vojvodina within the context of Serbia through an analysis of the labour market, with a specific emphasis on regional development. Border municipalities, as specific geographical entities, face challenges arising from their proximity to the country's borders, which further impact the economic characteristics of these areas. Through comprehensive research, employing a combination of quantitative and qualitative methods of data analysis, the study examines the influence of various factors on employment, unemployment, and overall economic activity in Serbian border municipalities from 2011 to 2022. By focusing on the labour market, a deeper understanding of the specific economic structure of these municipalities is gained, taking into account local and regional characteristics. The study investigates factors affecting employment, such as the educational structure of the population, the availability of education and training, as well as investment attraction. The dynamics of unemployment are also analysed, considering its relationship with seasonal variations and structural changes in the labour market. Additionally, the paper explores the connections between the labour market and broader regional development, examining how economic activity in border municipalities contributes to or restricts overall regional development in Serbia. In this context, the focus will be on border municipalities with Croatia, including Sombor, Apatin, Odžaci, Bač, Bačka Palanka in Bačka, and one municipality in Srem, Šid. Identification of key challenges and opportunities for improving the labor market in these municipalities can provide a foundation for the development of policies aimed at enhancing regional economic stability, especially considering the sensitive position of border municipalities in Serbia.

Keywords: border municipalities, Autonomous Province of Vojvodina, labour market, regional development, unemployment

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Demographic tendencies in the Serbia-Croatia border region: A case study of the Zapadnobačka and Osiječko-baranjska region

Demographic trends are a current topic today, because a large part of the European continent, and therefore the post-Yugoslav countries, are characterized by processes of depopulation, senility, and significant emigration. The border areas of the states, which are located outside the main economic streams in the country, are particularly at risk and are rapidly becoming depopulated. The paper focuses on studying the demographic characteristics of the border area of the Republic of Serbia and the Republic of Croatia. The analysis was carried out at the level of NUTS 3 (Zapadnobačka oblast in the Republic of Serbia and Osiječko-baranjska županija in the Republic of Croatia) to observe the similarities and differences in the demographic characteristics of the mentioned territory. Census data from both countries were used (Croatia – 2011 and 2021; Serbia – 2011 and 2022). One of the priorities of the work is to determine the trend of population movement in the border area of one country that is a member of the European Union (the Republic of Croatia since 2013) and another, neighbouring country, which is a candidate for membership (the Republic of Serbia since 2012). The following were considered: the change in the number of inhabitants, the average age of the population, the rates of birth, mortality, and natural increase, the rates of emigration, immigration, and migration balance, the age-sex structure of the population, to more meaningfully understand the demographic tendencies of this border area and give predictions for the future. The results of the research show that between 2011 and 2022, the Zapadnobačka oblast lost 33,596 inhabitants, i.e. 17.86%, while Osiječko-baranjska županija lost 47,006 inhabitants in the period from 2011 to 2021, i.e. 15.41%. Such data were influenced by the decline in fertility, negative natural growth, and the migration balance. Bearing this in mind, the paper proposes measures that can improve the demographic picture of the studied area, and they concern cross-border cooperation between the two countries and the application of good practice solutions implemented by countries facing the same problems.

Keywords: Depopulation, natural increase, migration, age-sex structure of the population

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https://doi.org/10.59954/PPYCDSP2024.45

Correlation and regression analysis of the population change index of border municipalities of the Republic of Serbia, 2011–2022

The border municipalities of the Republic of Serbia are most often seen as peripheral in the geographical, demographic, social and economic sense. Serbia, like other post-Yugoslav countries, underwent crucial changes during the 1990s. They encouraged the intensification of unequal regional development in the centre–periphery relation. Although some border territories of European countries deviate from this pattern, the border effect has led to numerous negative consequences of the polarization process in Serbia, especially in those border municipalities with a longer peripheral status. Since depopulation is one of the biggest development problems in Serbia, the population change index 2011–2022 was studied using methods of correlation and regression analysis of demographic and social-economic indicators. Correlation analysis found that there is a medium or strong relationship with six indicators, while regression analysis showed that even those negligible variables in correlation analysis, such as the number of employees in the primary sector, can be significant. By applying the multiple regression method, it was determined that the population change index of 44 border municipalities can be predicted using three independent variables: the rate of natural increase, the number of marriages and the number of employees in the primary sector. The obtained regression model proved to be significant, considering the satisfactory value of the adjusted coefficient of multiple determination (adj R^2=0.707) and the p-values of the independent variables below the threshold value ($p < 0.05$). As an outlier, the municipality of Čajetina stands out, for which the adopted model predicted a decrease in the number of inhabitants by 12.8% (the actual decrease is about 1.1%), while the absolute residual values for the other border municipalities range in the interval of 0.05 (City of Sombor) to 7.83 (municipality of Tutin). The aim of the paper is reflected in the importance of the application of selected statistical methods in demographic analysis.

Keywords: Correlation and regression analysis, depopulation, population change index, border municipalities, Serbia

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https://doi.org/10.59954/PPYCDSP2024.46

GIS Analysis of Changes in the Spatial Distribution of the Population – Case Study of the Trebinje Region (Republic of Srpska)

The territory of Bosnia and Herzegovina and Republic of Srpska has been affected by negative demographic processes for the last three decades. The depopulation process is primarily a consequence of the war events in the early nineties. Due to increased mortality and forced war migrations, large population losses occurred. The process of depopulation continued even after the war. Negative natural growth, insufficient births, shifting of the birth age limit, emigration of the population abroad, ageing of the population are just some of the demographic problems. The emphasis in this research is on the Trebinje region, which is one of the 7 regions of the Republic of Srpska (according to the Spatial Plan of the Republic of Srpska). It is a part of the former region Herzegovina, which after the division of BiH is a part of Republic of Srpska. The Trebinje region is a depopulated and heavily immigrated area. In addition to the basic demographic characteristics of the region, the paper will show the spatial distribution of the population. A GIS model of spatial analysis will be used for the spatial analysis of demographic characteristics. As the most important indicators of changes in the spatial distribution of the population, the method of the spatial arithmetic mean of the population (Mean Centre) and the ellipse of the direction of the distribution of the population (Standard Deviation Ellipse) through the census years will be applied. GIS models are suitable for researching areas that have a small number of inhabitants and negative demographic trends that can be expected in the future. Such is the area of the Trebinje region, which according to the last census has approximately 100,000 inhabitants. The basic source of data is the official population census data, as well as other demographic statistics of the Institute of Statistics Republic of Srpska and the Agency for Statistics BiH. The goal of the research is to determine and map the demographic processes in the Trebinje region, with an emphasis on changes in the spatial distribution of the population and settlement. With the aim of better spatial targeting of demographic and economic revitalization measures,

GIS models can be applied for spatial monitoring of demographic trends and spatial planning.

Keywords: population, Trebinje region, GiS model, spatial analysis

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https://doi.org/10.59954/PPYCDSP2024.47

Population policy to low fertility in the Republic of Srpska. The example of the city of Bijeljina

The subject of this paper is the research on low fertility in the City Bijeljina and finding its solution through population policy measures. Based on the attitudes of women of childbearing age, possible population policy measures that would contribute to changing attitudes regarding reduced birth rates were examined. The relevant data is collected through the use of a survey questionnaire filled by a verified sample of 1000 women in their reproductive period (aged 15–49). In order to evaluate the role of each research variable in the prediction of fertility intentions, the arithmetic mean, frequency of responses in percentage, Pearson coefficient, and binary logistic regression model were used to explore the related factors of fertility behaviours among women in this population. The results showed the Pearson correlation coefficient indicate a significant relationship between the birth of the desired number of children in conjunction with the proposed measures such as financial benefits (Pearson .072*; p≤.023), flexible working time (Pearson .067*; p≤.035), the growth of the coefficient for each child (Pearson .068*; p≤.033). By applying binary logistic regression, the financial subsidy was singled out as the backbone of future births. Those measures of population policies factors affect desired family size and have proven to be essential components of future fertile behaviour. The research results show tendencies towards more positive fertility decisions and increased participation of women in the field of reproduction. The implementation of new measures in the system of population policy at the local level would enable the women in the City Bijeljina to give birth to the desired number of children.

Keywords: Fertility; factors, City Bijeljina; population policy

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https://doi.org/10.59954/PPYCDSP2024.48

Consequences of economic transition on demographic processes in the Baranja region in the Republic of Croatia

The transition of the European former socialist countries had different consequences on their development. Most of the countries did not achieve the expected successes. The border regions in this context become connectors and initiators of the cross-border cooperation, due to the relation intensification between the transition countries and the developed countries of the European Union. The research studies the impact of the transition on the integration of the Baranja within the framework of the national and wider regional market – especially in the conditions of globalization, changes in the geographical position and the meaning of borders within the framework of the European Union and the Schengen area. The area of Baranja is organized as part of the Osijek-Baranja County, organized through nine local self-government units and 52 settlements, one of which is a town. Differences in the forms and intensity of spatial processes in the transition are conditioned by the location, traffic accessibility and the change in the meaning of the main centres of work and have influenced the strengthening of negative demographic processes near the state border. A demogeographical analysis was made according to the data available from authorized databases and supplemented by the research interview method. Demographic dynamics, total population change and changes in population structures from 1991 to the recent period, 2021, were analysed. A comparison of the age index over time indicates an advanced process of senility and the absence of bioreproductive potential. Traditionally low birth rates, war events and emigration of the population have had a negative impact on the recent regional demographic and economic development. In addition to intensive emigration, which was most pronounced in the nineties and after the accession to the European Union, this cumulatively adds to the impossibility of valorising the economic potential. Despite the expected development shifts through the process of transition, in the case of the border region of Baranja, the result is the opposite. In order to confirm this, the method of calculating a synthetic indicator, the index of demographic resources, was used. The components of the

index are the demographic index and the education index and clearly indicate the collapse of the demographic potential in the observed area. Microsoft Excel and Arc Map 9.3 techniques were used for tabular analysis of statistical data and visualization of selected parameters. The region lags behind the national and European average because, at the beginning of the system reforms, it was not brought to an equally position to participate in development. New opportunities for the researched area appear due to the change in geographical position by joining the European Union and the Schengen area. A possible solution to stagnation would be economic development based on a multi-sectoral model of economic development. For the stabilization of rural areas and the inclusion of Baranja in regional flows and the European market, a more coherent spatial organization is necessary, with the functional strengthening of central settlements. The construction of the Vc corridor opens numerous opportunities for networking, cross-border cooperation and territorial cohesion.

Keywords: transition, demographic processes, spatial development effects, regional development, territorial cohesion

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https://doi.org/10.59954/PPYCDSP2024.49

Assessment of the population exposed to pluvial floods using very high resolution data: case study of Metković, Croatia

Rapid urbanization and global climate change are leading to increasingly frequent and severe pluvial floods that often affect many people around the world. Assessing the population exposed to pluvial floods is crucial for making optimal decisions in flood prevention and mitigation, but depends heavily on the accuracy of data sets. For this reason, the paper proposes an approach based on very high-resolution data and scenarios that connect hydrological-hydraulic modelling and GIS analyses to estimate the population exposed to pluvial floods. Hazard models and dasymetric models at the level of individual buildings were created, integrating and synthesizing data from various sources. The analysis of pluvial flood hazards in the Metković settlement watershed was conducted following the methodology proposed and developed within the STREAM Interreg project. Flood hazards were assessed through hydrological-hydraulic simulations of surface runoff from precipitation. The basis for these simulations was precipitation defined by design storms for different probabilities. Various spatial layers were collected and generated for hydrological-hydraulic analysis of precipitation runoff, including DTM, land cover, land-surface impermeability, surface roughness, and infiltration (CN curve numbers). The foundation for creating the dasymetric model was building footprints extracted using GEOBIA based on a multispectral model, building height and shape data obtained from processing aerial LiDAR, spatial plan data, population data by statistical circles, and field research. Buildings were classified into residential and non-residential, with residential structures further classified into houses and multi-unit buildings. The results of flood hazard analysis include maps of water depth and velocity, as well as hazard levels for each observed probability. The exposure assessment of the population was conducted through GIS analyses by identifying the number of exposed populations. The results show that the number of people exposed to pluvial floods is significantly reduced, for different probabilities, when using the population count at the building level compared to conventional

population datasets. The approach and data obtained can be used to improve the efficiency of emergency interventions, enhance vulnerability assessments, increase the accuracy of local flood models, and better understand the interactions between land cover, climate, population, and floods.

Keywords: hazard models, dasymetric model, pluvial floods, Metković, Republic of Croatia

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https://doi.org/10.59954/PPYCDSP2024.50

Demographic aspects of the planned resettlement of settlements in Lazarevac municipality

The planned resettlement of settlements in the course of the expansion of open-cast mining in the Kolubara mining basin has an impact on all aspects of social life in the municipality of Lazarevac. Primarily, this impact is reflected in the demographic development of the area. The expansion of coal mining and the immediate proximity to Belgrade, are the cause of significant demographic shifts. The municipality has 33 settlements, a third of which are located in the exploitation area. The number of inhabitants in some settlements is drastically decreasing, and some of them are completely displaced, while on the other side, there is a sudden influx of population in the city of Lazarevac and the secondary centres of the municipality (Veliki Crljeni, Stepojevac), both from the municipal territory and from other parts of Serbia, motivated by the economic advantages of Lazarevac and its surroundings. This fact determines the trend of a constant increase in the number of inhabitants in urban settlements in all observed intercensal periods from 1948 to 2022, while the decline in the number of inhabitants in rural settlements has been observed since the 1981–1991 census period. The sudden increase in the number of inhabitants in urban settlements since the 1980s can be explained by the intensification of mining operations and the process of expropriation taking place in rural settlements. According to the last census in 2022 – 55,146 inhabitants live on the territory of Lazarevac municipality, of which 27,635 live in the only urban settlement in the municipality and 27,511 in rural settlements. The data indicates that for the first time, the urban population in the municipality exceeds the rural population. This paper focuses on analysing the impact of the decades-long development of mining activity on the territory of the municipality of Lazarevac on the population and the comprehensive development of the settlement, both in a positive and negative context. The research also focuses on the transformation of the settlement environment caused by the expansion of open-cast mining, with an emphasis on the changes in the demographic characteristics of the settlement. The paper is based on the analysis of data from the Statistical Office of the Republic of Serbia, settlement regulation plans in the process

of resettlement, the plan for the mining area of the Kolubara lignite basin and other sources relevant to the understanding of the given problem, as well as on the spatial representation of data using GIS software and tools. If we compare the dynamics of the expansion of the mines and the population of the Lazarevac municipality (before the start of open-cast mining and today), certain trends can be observed that make it possible to understand the demographic aspect of the process of planned displacement.

Keywords: planned resettlement, Kolubara mining basin, Lazarevac municipality, population

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