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DEMOGRAPHIC THRESHOLDS AND IDENTITY SUSTAINABILITY IN SHRINKING RURAL COMMUNITIES: A CROSS-BORDER STUDY OF GREATER CUMANIAN SETTLEMENTS IN HUNGARY AND SERBIA

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The accelerating demographic shrinkage of rural areas and its impact on community survival represent a critical challenge in contemporary Central Europe, necessitating a deeper understanding of the link between population structures and cultural sustainability. ***This study aims*** *to examine these interconnections through a cross-border comparison of four Greater Cumanian (Nagykun) settlements in Hungary and Serbia (Vojvodina), exploring how population decline, ageing, and out-migration create "threshold conditions" that endanger the intergenerational reproduction of community heritage. We employed a mixed-methods approach, combining a longitudinal demographic analysis (1949–2022) with 23 in-depth stakeholder interviews and a Likert-scale survey to compare subjective crisis perceptions with objective statistical trends.* ***Results reveal*** *a sharp divergence: while Hungarian small towns (Karcag, Kisújszállás) exhibit relative demographic resilience, the Vojvodinian peripheries (Bácskossuthfalva, Pacsér) face extreme population loss–retaining less than half of their baseline populations–and critical rejuvenation indices. A key finding is the strong negative correlation (r = -0.95) between ageing and population change, alongside a direct link between economic diversification and demographic regeneration potential (r = 0.90) for net wages and child population. These findings are highly applicable to regional development policies for shrinking European peripheries, proving that identity preservation is a direct function of economic retention capacity and institutional density.* ***The study concludes*** *that as spontaneous family-based socialization weakens, cultural continuity must rely on deliberate institutional compensatory mechanisms; without targeted structural interventions, communities falling into a "demographic trap" face the irreversible erosion of their lived cultural heritage.*

Key words: *rural shrinkage, demographic resilience, critical demographic mass, Greater Cumanian settlements, identity sustainability, cross-border regions*

ДЕМОГРАФІЧНІ ПОРОГИ ТА ЗБЕРЕЖЕННЯ ІДЕНТИЧНОСТІ У СКОРОЧУВАНИХ СІЛЬСЬКИХ ГРОМАДАХ: ТРАНСКОРДОННЕ ДОСЛІДЖЕННЯ ПОСЕЛЕНЬ ВЕЛИКОЇ КУМАНІЇ В УГОРЩИНІ ТА СЕРБІЇ

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Актуальність дослідження. *У сучасних умовах депопуляції сільських територій Центральної Європи особливої ваги набуває розуміння зв'язку між демографічними процесами та збереженням культурного коду, тому метою цього дослідження є аналіз взаємозв'язків між демографічним скороченням та стійкістю культурної ідентичності на основі транскордонного порівняння чотирьох поселень Великої Куманії в Угорщині та Сербії (Войводина).* ***Робота висвітлює,*** *як депопуляція, старіння та селективна еміграція створюють «порогові умови», що безпосередньо загрожують міжпоколінному відтворенню спадщини громади. У дослідженні застосовано змішаний підхід, що поєднує лонгітюдний демографічний аналіз (1949–2022) із 23 напівструктурованими глибинними інтерв'ю та опитуванням стейкголдерів за шкалою Лікерта для зіставлення суб'єктивного сприйняття кризи з об'єктивними статистичними даними. Виявлено різку дивергенцію: тоді як угорські малі міста (Карцаг, Кішуйсаллаш) демонструють відносну демографічну стійкість, периферійні райони Войводини (Стара Моравиця, Пачир) стикаються з екстремальною втратою населення, зберігши менш ніж половину вихідної чисельності, при цьому зафіксовано винятково сильну негативну кореляцію (r = –0,95) між старінням та демографічними змінами, а також прямий зв'язок між рівнем заробітної плати та чисельністю дітей (r = 0,90).* ***Аналіз доводить,*** *що за слабшання сімейної соціалізації культурна тяглість дедалі більше покладається на цілеспрямовані інституційні та символічні компенсаторні механізми. Отримані результати мають високу практичну цінність для розробки стратегій регіонального розвитку периферійних територій Європи, доводячи, що збереження ідентичності є безпосередньою функцією економічної здатності утримувати населення та інституційної щільності.* ***Дослідження доходить висновку,*** *що без цілеспрямованих структурних втручань громади, які опиняються у «демографічній пастці», приречені на невідворотну ерозію своєї живої культурної спадщини, оскільки стійкість ідентичності критично залежить від досягнення конкретних демографічних порогів.*

Ключові слова: *скорочення сільських територій, демографічна стійкість, критична демографічна маса, поселення Великої Куманії, стійкість ідентичності, транскордонні регіони*

Introduction. During the 20th and 21st centuries, the demographic structure of rural and peripheral areas worldwide underwent significant transformations, characterized by population decline, accelerated ageing, and out-migration of younger generations [1]. In Europe, this process is highly spatially differentiated: while metropolitan agglomerations experience population growth and economic dynamism, rural areas with low population density and limited access to institutional and economic opportunities show persistent decline and structural degradation [2], [3], [4].

Central and Eastern European regions follow a similar pattern. After the post-socialist transition, young workers increasingly migrated to metropolitan labour markets, while those who remained experienced accelerated ageing and negative natural population change, thereby exacerbating rural decline [5]. This structural depopulation endangers not only local economies but also social cohesion and the sustainability of community identity [6].

Recent international studies frame rural shrinkage as a multifaceted process, shaped by low fertility, ageing, and selective out-migration, often creating a self-reinforcing demographic spiral [7], [8]. While economically diversified small towns and urban centres may partially buffer these effects, peripheral agrarian regions are particularly vulnerable, risking disruption to social reproduction and the transmission of local cultural identity. The concept of rural resilience has emerged as a key framework for understanding how communities respond to these demographic and economic challenges: economic diversification, institutional presence, and social capital can mitigate, though not fully reverse, structural decline [9]. Comparative studies across Europe show that depopulation impacts intergenerational cultural continuity, particularly in communities where family and social networks serve as the primary conduits of heritage [10], [11], [12]. Post-socialist, cross-border regions exhibit unique vulnerabilities due to historical, geopolitical, and economic transitions [13].

Despite growing research on rural demographic trends, cross-border regions with shared cultural heritage in Central and Eastern Europe remain underexplored. This study examines the demographic trajectories and identity sustainability of Greater Cumanian (Nagykun) settlements on both sides of the Hungarian–Serbian border, combining quantitative population data with qualitative interviews. The research

focuses on how structural and economic factors shape generational continuity and cultural resilience in peripheral agrarian versus economically diversified settlements.

Beyond its empirical contribution, the study introduces two analytical concepts–*critical demographic mass* and *conscious identity*–to interpret the limits of demographic resilience and cultural reproduction in shrinking rural communities. These concepts are empirically grounded in demographic indicators and aim to provide a transferable framework beyond the specific Greater Cumanian case. *Demographic resilience* refers to a community's ability to adapt to and manage the negative effects of population decline, ageing, and out-migration while maintaining its core functions. Rather than simply avoiding demographic crises, a resilient community employs social, institutional, and cultural strategies–such as identity preservation and innovative public services–to ensure its long-term social reproduction and survival even in a shrinking environment.

Two research questions were posed and two hypotheses were formulated in connection with the research:

Research Questions (RQs):

RQ1: How do demographic trends–population change, ageing, and reproductive patterns–differ between Greater Cumanian (Nagykun) settlements in Hungary and in Vojvodina, Serbia?

RQ2: How do structural factors–economic diversification, settlement hierarchy, and institutional presence–affect demographic resilience and the sustainability of local cultural identity?

Hypotheses (H):

H1: Peripheral, agrarian-dominated settlements in Vojvodina experience faster population decline, accelerated ageing, and greater disruption of generational continuity compared to economically diversified small towns in Hungary.

H2: Higher economic diversification, stronger institutional presence, and higher settlement hierarchy positively correlate with demographic resilience and the capacity for intergenerational transmission of local identity.

Literature review. The demographic decline of rural areas has become a central focus of research in regional science and demography in recent decades. International literature agrees that rural population decline is not simply the result of natural decline, but a structural process in which low fertility, ageing, and–also by gender–selective migration act as mutually reinforcing mechanisms [7], [8], [11], [12].

Several comparative studies emphasize that the phenomenon of "shrinking rural areas" is not only a demographic issue but also an economic and social one. Population decline narrows the local labour market, degrades public services, and erodes the conditions of social reproduction, resulting, over the long run, in a self-reinforcing spiral of decline [14]. Migration plays a key role in this: the emigration of younger and more educated age groups disproportionately weakens the demographic [and therefore economic] regeneration capacity of rural communities [7].

Meanwhile, increasing attention is being paid to the concept of rural resilience, which examines the adaptive capacity of rural areas to demographic and economic shocks. Resilience research shows that economic diversification, institutional presence, and social capital can mitigate the negative effects of shrinkage, even when population decline remains structural [9]. Small urban centres that fulfil multifunctional roles experience slower demographic decline than agrarian-dominated peripheries.

Studies examining the cultural dimensions of demographic decline emphasize that population decline also has a direct impact on the sustainability of local identity and community memory. Ageing and generational disruption pose a particular risk in regions where identity is primarily based on family and community socialization [10]. While institutional management of cultural heritage can mitigate the process, it cannot, by itself, counteract the erosion of demographic foundations.

In Hungary, rural shrinkage shows a distinct pattern closely linked to spatial peripherality and economic inequalities. Empirical studies confirm that the intensity of population decline

is highest in small settlements and agricultural areas, whereas functionally diversified small towns show relative demographic resilience [15]. These findings align with the international literature and confirm that economic capital and institutional background play a key role in the sustainability of social reproduction.

Research on rural areas in Serbia also highlights the dual impact of migration and ageing, especially in the context of post-socialist transition and international labour mobility. Vojvodina's demographic processes fit into this structural pattern. According to Serbian census data, the region's population decreased by almost 10% between 2011 and 2022, while the number of ethnic Hungarians fell by more than a quarter [13]. In rural areas of Vojvodina, population decline is faster than in urban centres, a trend further exacerbated by ageing, low levels of human capital, and limited economic diversification [16].

Studies examining the demographic situation of the Hungarian community in Vojvodina emphasize that the emigration of young people, the low birth rate and the uncertainty in the labour market not only mean population loss, but also a long-term risk to identity and community maintenance [17], [18].

Although the region is underrepresented in the international literature, the available empirical evidence indicates that the demographic trajectories of the Vojvodina peripheries generally align with the broader patterns of rural shrinkage in Central and Eastern Europe [8].

Overall, the literature clearly supports the view that rural shrinkage is not merely a demographic phenomenon but a complex socio-economic process that directly influences the conditions of local identity, community continuity and cultural reproduction. In this framework, the present research interprets the demographic trajectories of settlements of Greater Cumanian (Nagykun) origin not as isolated cases, but as part of the structural challenges of European rural peripheries.

As a synthesis of the above approaches, the study applies a demographic–identity relational model, according to which the sustainability of cultural reproduction is a function of three interrelated factors:

1. Demographic structure (age composition, reproductive potential),
2. Economic embeddedness (income level, labour market conditions),
3. Institutional density (educational and cultural infrastructure).

The model assumes that below a critical threshold of these factors, the transmission of community identity follows a nonlinear decline trajectory.

Material and method. *Material*

The study covers four settlements with different settlement hierarchies and geopolitical situations (N = 4): Pacsér and Bácskossuthfalva (Serbia, Vojvodina), and Kisújszállás and Karcag (Hungary). Settlement selection criteria: (1) shared Greater Cumanian (Nagykun) heritage, (2) divergent geopolitical environments (Hungary vs. Serbia), and (3) comparable functional roles (Figure 1.).

The analysis was based on secondary statistical data, which primarily concerned population trends, age composition, economic structure and income conditions. Population data were available only at discrete points in time (from the mid-20th century to 2022), and annual time series were unavailable. The data source for Hungary was the Central Statistical Office [19], whereas for settlements in Vojvodina, the settlement- and district-level databases of the Statistical Office of Serbia [20] and the estimates derived from them served as the basis.

Certain economic indicators (GDP per capita, net average wage) were not directly available at the settlement level, therefore, in their case, estimated values were used, primarily by proportionally adjusting district and regional data to the settlement level. The estimated intervals were represented by the median value in the analyses (Table 1). Data limitations were consistently taken into account when interpreting the results.

The basis of the sampling is the Greater Cumanian (Nagykun) identity as a constant cultural variable. This makes it possible for the research to examine, in a controlled man-

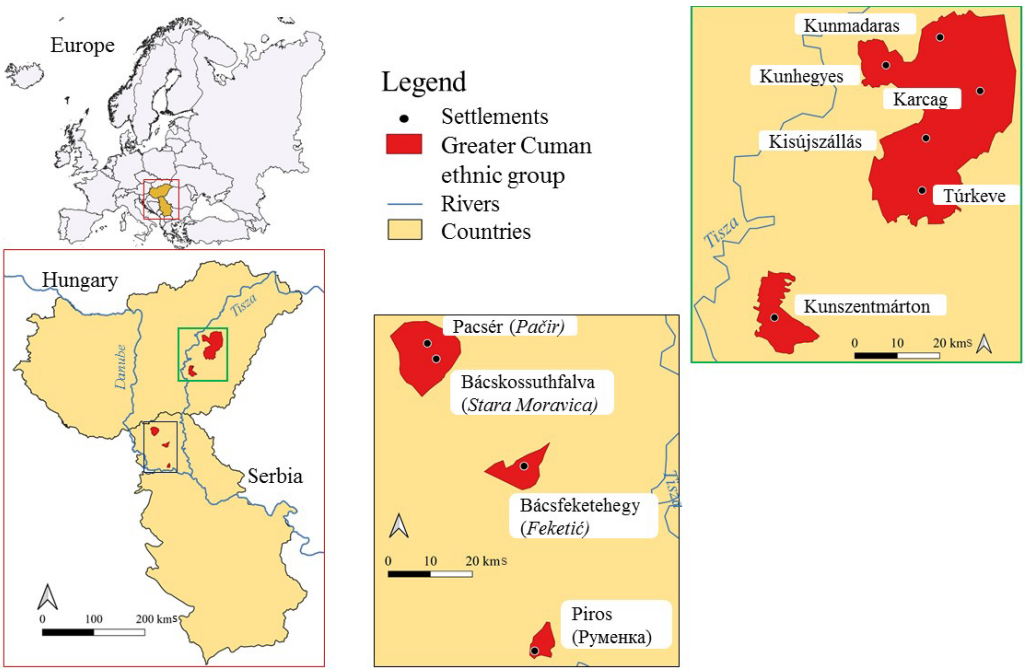

Fig. 1. Areas inhabited by the Greater Cumans in Hungary and Serbia

Source: Own editing

Table 1

Data of the sample areas

Indicator	Pacsér	Bácskossuthfalva	Kisújszállás	Karcag
Country	Serbia (Vojvodina)	Serbia (Vojvodina)	Hungary	Hungary
Population (peak season, people)	4,332 (1953)	6,052 (1961)	13,817 (1949)	25,551 (1960)
Population (1990/1991, person)	3,313	4,416	13,160	23,828
Population (2011, person)	2,580	3,923	11,397	20,606
Population (2022, person)	1,806	2,812	10,049	18,525
Population change (2011–22)	-30.0% (critical)	-28.3% (strong)	-11.4% (moderate)	-10.1% (moderate)
Largest nationality (2022)	Hungarian (59%)	Hungarian (75%)	Hungarian (92%)	Hungarian (90%)
Proportion of elderly people (65+)	26%	24%	21,80%	20,50%
Proportion of children (0-14 y. o.)	11%	12%	14.20%	15.10%
Main economic profile	Agriculture, Tourism	Agriculture, SMEs	Agriculture, Services	Mechanical engineering, Food industry
GDP per capita (estimated, EUR, person/year)	~7,570 EUR	~8,170 EUR	~9,630 EUR	~10,665 EUR
Average net salary (estimated, EUR, per person/month)	~700-750 EUR	~750-800 EUR	~850-920 EUR	~950-1050 EUR
Unemployment	~5% (hidden high)	~4-5%	3.80%	4.20%
Identity–institutional density (per 1,000 inhabitants)	Low (isolated collections)	Moderate (local heritage house, local library)	High (museum, specialized collections)	Outstanding (nationally significant center)
Number of active civil organizations	2–3 (low activity level)	4–5 (moderate activity level)	10+ (high activity level)	15+ (intensive networking)
Educational identity base	Primary school (declining)	Primary school (more stable)	Secondary education center (grammar school)	Regional educational center (grammar schools, vocational training)

Source: Based on data of Hungarian Statistical Office [19] and the Statistical Office of Serbia [20].

ner, the impact of the geopolitical environment: while the cultural roots are identical, the macroeconomic frameworks differ.

It is important to emphasize, however, that the divergent demographic trajectories do not stem solely from country-level differences, but also from differences in settlement hierarchy, as the Hungarian cases possess small-town functions, whereas the Vojvodina cases are more characteristic of rural peripheries.

Method

This study employs a comparative spatial design focusing on four settlements of Greater Cumanian (Nagykun) origin (N = 4): Pacsér and Bácskossuthfalva (Serbia/Vojvodina), and Kisújszállás and Karcag (Hungary). The selection criteria were: (1) shared ethno-cultural roots, (2) divergent geopolitical and economic trajectories, and (3) comparable hierarchical functions.

Quantitative analysis uses secondary longitudinal data (1949–2022) from the Hungarian Central Statistical Office (KSH) [19] and the Statistical Office of the Republic of Serbia (RZS) [20]. As annualized time series are unavailable, a periodized trend analysis was conducted. Economic indicators (GDP per capita, net wages) were harmonized at the district level using proportional estimation and reported as medians to ensure cross-border comparability.

To quantify demographic resilience and structural degradation, the following indicators were calculated:

– Standardized Population Index: Normalized to the demographic peak (100) of each settlement (1949–1962) to measure long-term retention capacity.

– Average Annual Growth Rate (AAGR): Employed for exponential change analysis between census periods.

– Rejuvenation Index: Defined as the ratio of the population aged 0–14 to those aged 65+, serving as a proxy for intergenerational continuity.

– Migration Balance: Estimated as the residue between total population change and natural increase/decrease.

– Identity-Institution Density (IID): Number of permanent institutions preserving Greater Cuman or Hungarian heritage (heritage houses, museum collections, monuments) per 1,000 inhabitants.

– Civil Activity Index (CAI): Number of active cultural, tradition, and community associations, reflecting community self-sufficiency.

– Institutional Presence (school network): Number and type of mother-tongue education and cultural socialization sites (kindergarten, primary, secondary).

Pearson's correlation coefficient (r) was utilized to identify cross-sectional relationships between demographic markers and economic variables.

The 23 semi-structured in-depth interviews were conducted through purposive, stakeholder-based sampling (between 2023–2024). The participants included key local decision-makers and opinion leaders, such as mayors, notaries, physicians, school principals, cultural managers, local media representatives, and leaders of NGOs.

The data collection was carried out in multiple rounds. In the Hungarian study areas, face-to-face interviews were conducted with participants who could accommodate a personal meeting. For those unavailable for in-person sessions, a digitally adapted version of the semi-structured interview was provided. This same online methodology was applied to the Serbian study areas, facilitated by local contact persons to ensure consistent data quality.

During the evaluation, we employed inductive coding, allowing for the systematic analysis of subjective perceptions. Furthermore, respondents evaluated specific crisis factors using a Likert-type scale ranging from 0 to 8, enabling the integration of qualitative nuances with quantifiable trends.

The interview instrument was designed to provide a comprehensive overview of local conditions, covering 196 specific parameters related to demographic trends, social infrastructure, and identity preservation. For each parameter, respondents provided evaluations

on a scale of 0 to 8, where 0 indicated the total absence or insignificance of a phenomenon, and 8 represented a critical or extreme state.

These 196 variables were processed using inductive coding, allowing for the identification of recurring patterns and subjective crisis narratives. This extensive data set enabled us to compare the objective statistical markers with the internal perceptions of local stakeholders, ensuring that the qualitative analysis is based on a robust and multidimensional empirical foundation.

Results. The analysis of long-term demographic data reveals clear and systematic differences between Greater Cumanian (Nagykun) settlements in Hungary and Vojvodina. All examined settlements are affected by population decline; however, the intensity and underlying drivers of this process vary significantly across national and settlement contexts.

In the Vojvodinian settlements (Pacsér and Bácskossuthfalva), population decline is more pronounced and structurally embedded. These settlements experienced accelerated ageing, a rapid rise in the old-age dependency ratio, and substantial migration losses among younger, economically active cohorts. Migration emerged as the dominant factor shaping demographic trajectories, amplifying the effects of negative natural population change.

In contrast, the Hungarian settlements (Kisújszállás and Karcag) show a slower rate of population decline and a more balanced age structure. Although natural decrease remains a significant challenge, migration losses are less severe. The higher settlement hierarchy, broader economic base, and stronger institutional presence of these towns contribute to greater demographic stability.

Qualitative interview results further indicate that structural factors–such as economic diversification, availability of local services, and institutional embeddedness–are closely linked to demographic resilience. In settlements with more diversified economies and stable institutional frameworks, respondents reported stronger perceptions of future viability and greater opportunities for the intergenerational transmission of local cultural identity. In contrast, peripheral agrarian settlements with limited institutional capacity face increasing difficulties in maintaining community cohesion and cultural continuity.

Results of statistical data analysis

The analysis aims to empirically test the proposed demographic–identity model, focusing on how demographic structure and institutional density affect the sustainability of community reproduction. Using a contrastive approach, it highlights how communities with similar cultural capital diverge demographically under macro-level economic and settlement-hierarchy differences. The demographic profiles of the Greater Cumanian (Nagykun)-origin settlements studied thus represent not isolated cases but interrelated, contrastive patterns that reveal tangible spatial and structural differences.

The demographic profiles of the examined Greater Cumanian (Nagykun) settlements show pronounced spatial and structural differentiation. Between 2011 and 2022, population decline was extreme in the Vojvodinian study areas (−28–30%), whereas it remained moderate in Hungary (−10–11%). This divergence reflects not merely a quantitative deficit but also a qualitative crisis of social reproduction. The strong positive correlation between settlement size and population change ($r = 0.93$) confirms that the spatial concentration of services and functions is a fundamental factor in demographic resilience. This chain is particularly pronounced in cross-border, agrarian-dominated peripheral areas, whereas economically more diversified small towns–such as Karcag–experience a slower decline. This confirms that a favourable position in the settlement hierarchy and a more stable demographic structure directly protect the transgenerational processes of identity preservation.

Cross-sectional analyses reveal a key structural driver of demographic decline: the exceptionally strong negative relationship between the proportion of elderly residents and population change ($r = −0.95$) shows that population ageing is both a cause and a consequence of the contraction of natural increase

and the out-migration of younger generations. In contrast, the significant associations between the share of the child population and economic indicators–such as GDP per capita (r = 0.88) and net average wages (r = 0.90)–underscore that a more favourable economic position directly enhances the demographic regeneration potential of local communities.

Overall, the results delineate a clear demographic–economic gradient: smaller settlements are associated with lower income levels, higher ageing rates, and accelerated population decline. This chain of processes is particularly evident in cross-border, agrarian-dominated peripheral areas, whereas small towns with more diversified economic structures–such as Karcag–exhibit temporary structural resilience. Time-series data (Figure 2) confirm that population loss in the Vojvodinian settlements began before the political transition and has become cumulative, whereas demographic decline in Hungarian small towns emerged later and in a more moderate form. This differentiated trajectory reflects the combined effects of settlement hierarchy, selective migration, and divergent geopolitical–institutional contexts, highlighting both the persistent vulnerability of peripheral agrarian regions and the time-limited protective effect of small-town functions.

The demographic trajectories of the examined study areas can be classified into three distinct types: a model of early and accelerating decline (Pacsér and Bácskossuthfalva), delayed regression (Kisújszállás), and relative resilience (Karcag). While the Vojvodinian settlements have entered a state of "demographic shrinkage" considered drastic even in international comparison–retaining less than half of their baseline population by 2022 (41.7–46.5%)–the Hungarian small towns, owing to their urbanization level and institutional functions, have been able to stabilize approximately 70–73% of their baseline values.

Average Annual Growth Rate (AAGR) indicators further highlight the depth of the crisis: annual population loss in the Vojvodinian settlements (−1.08 to −1.24%) is nearly three times that in the Hungarian cases, indicating a persistent structural decline rather than cyclical fluctuations.

The rejuvenation index, a key determinant of local identity sustainability, reveals critical fault lines. The low values observed in Pacsér (42) and Bácskossuthfalva (50) foreshadow a breakdown in the generational chain, where selective migration has undermined the physical basis of intergenerational cultural transmission. In contrast, the indices for Karcag (73) and Kisújszállás (65) still provide relatively favourable conditions for community continuity, although rising dependency ratios (55–58) increasingly force local human resources to prioritize economic survival even in these settlements. The data highlight that maintaining Greater Cumanian (Nagykun) identity is not only an emotional issue but also a matter of demographic critical mass. In Pacsér, a youth index of 42 and a high dependency ratio indicate that community energy is focused on daily survival, so rituals of identity transmission (e.g., tradition days, family storytelling) face practical obstacles due to breaks in the "generational chain.

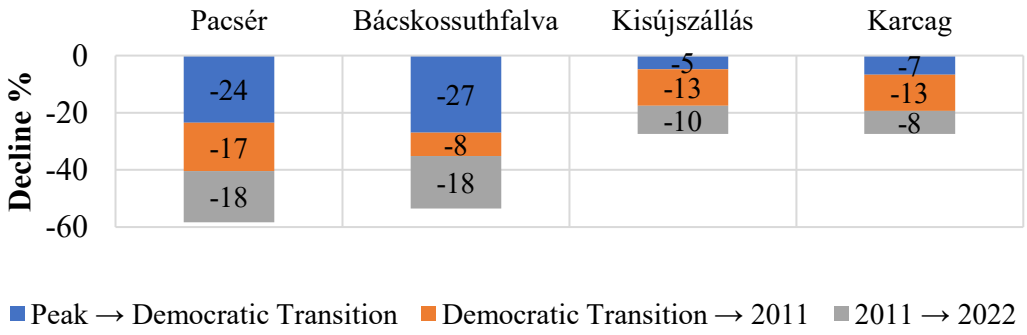

Fig. 2. Change in population size by period (%)

Source: Own editing.

The internal dynamics of population decline also differ fundamentally between the study areas. In Vojvodina, out-migration accounts for the dominant share of population loss (approximately 60%), primarily affecting the 20–40 age cohort and closely linked to the pull of European Union labour markets. In Hungary, by contrast, 70–75% of demographic decline stems from natural decrease, while the migration balance remains relatively stable (−2.6 to −3.5%).

In summary, the findings demonstrate that economic diversification and access to state development resources significantly slow population decline, whereas agrarian-dominated peripheral areas have entered a "demographic trap," in which mutually reinforcing processes of ageing and out-migration endanger the material and social foundations of Greater Cumanian (Nagykun) identity.

The study revealed a strong correlation between identity-institution density and demographic resilience. In Karcag and Kisújszállás, an extensive school network and numerous civic organizations can offset the cultural vacuum caused by natural population decline, whereas in the Vojvodina periphery, institutional erosion accompanies population loss. The contrastive case study highlights that demographic structure and settlement-hierarchy position together determine whether a community possesses the institutional critical mass needed to maintain a "conscious identity".

Results of semi-structured in-depth interviews

The qualitative phase of the research involved 11 prominent stakeholders from the Hungarian study area and 12 from the Vojvodinian region in Serbia. Respondents evaluated the severity of demographic stressors using a Likert-type scale ranging from 0 to 8. As illustrated in Figure 3, the subjective perceptions of local actors reveal significant regional divergences that nuance the objective statistical trends.

In the Hungarian study area (Kisújszállás–Karcag), respondents assigned exceptionally high, near-critical scores to population ageing (7.5) and the decline in the economically active population (6.2). Within this context, the distorted age structure (5.0), nationality and ethnic issues (5.6), and gender imbalance (4.5) also emerged as "serious" problems in local perception. These ratings indicate that in more urbanized Hungarian centres, the crisis is perceived primarily through the erosion of the active social strata and structural imbalances.

By contrast, respondents in the Vojvodinian study area (Bácskossuthfalva–Pacsér) primarily identified natural population decrease (6.2)

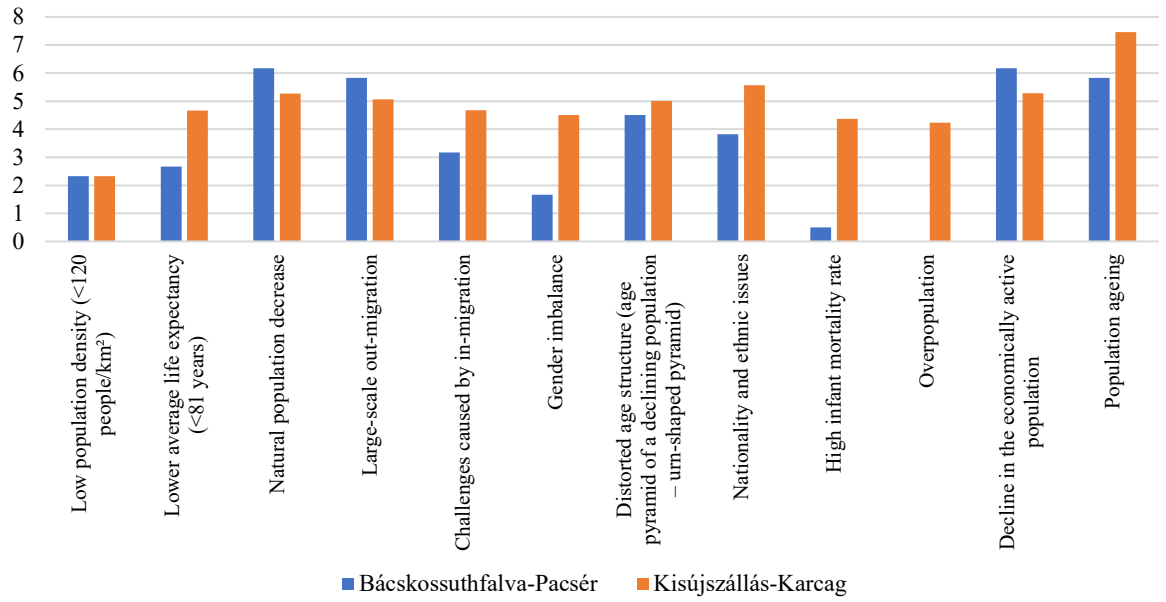

Fig. 3. Respondents' perceptions of the demographic factors of the study areas

Source: Own editing

and large-scale out-migration (5.9) as the dominant threats. While these areas face extreme statistical population loss, certain indicators were subjectively assessed as less critical: nationality and ethnic tensions (0.5), overpopulation (0.0), and infant mortality (0.5) were rated as negligible or very mild. Notably, despite the high average age in the region, population ageing was rated lower (5.9) than in the Hungarian sample, suggesting that local stakeholders in the Serbian periphery may view depopulation and migration as more immediate existential threats than the ageing process itself.

The aggregated mean values confirm that while Hungarian stakeholders perceive their demographic challenges as overall more "critical" (reaching level N in some cases), Vojvodinian respondents often employ localized coping strategies that lead to a more "moderate" subjective assessment (levels J, K) of even severe statistical realities.

Based on aggregated mean values, local stakeholders perceive the demographic problems of the Kisújszállás–Karcag area as more critical overall, whereas in the Bácskossuthfalva–Pacsér area, although significant challenges were identified, the situation was evaluated as more moderate in certain respects. According to the data presented in Table 2, several demographic indicators in the Hungarian study area (e.g., low population density, out-migration, and population ageing) reached the levels of "significantly severe" (L) or "critical" (N). In contrast, in the Vojvodinian region, most of these issues were classified only as "slightly" or "moderately severe" (J, K), highlighting perceptual gaps between statistical realities and locally embedded coping strategies.

Table 2

The extent of demographic problems in the study areas

Kisújszállás–Karcag	Demographic indicators	Bácskossuthfalva–Pacsér
D	Low population density (<120 people/km²)	D
I	Lower average age (<81 years)	E
J	Natural population decline	L
J	High emigration	K
I	Challenges caused by immigration	F
I	Gender imbalance	B
J	Distorted age structure (declining population age structure – urn-shaped age structure)	H
K	Ethnic and racial problems	G
H	High infant mortality	A
H	Overpopulation	A
J	Decline in the economically active population	L
N	Ageing	K

A: Negligible problem	B: Slightly mild problem	C: Moderately mild problem	D: Very mild problem	E: Severely mild problem	F: Slightly moderate problem	G: Moderately moderate problem	H: Very moderate problem	I: Severely moderate problem	J: Slightly serious problem	K: Moderately serious problem	L: Very serious problem	M: Severely serious problem	N: Critical problem
0–1	1.01–1.5	1.51–2	2.01–2.5	2.51–3	3.01–3.5	3.51–4	4.01–4.5	4.51–5	5.01–5.5	5.51–6	6.01–6.5	6.51–7	7–8

Source: Own editing

The analysis of local key actors' crisis perceptions highlights tensions between statistical data and lived social realities. Based on the questionnaire survey, respondents in the Hungarian study area (Kisújszállás–Karcag) classified a substantial share of demographic indicators as "significantly severe" (L) or at higher threat levels. Population ageing was judged particularly critical (N), while declining population density, natural decrease, large-scale emigration, and contraction of the economically active population were also classified as severe. In contrast, local stakeholders in the Bácskossuthfalva–Pacsér area subjectively assessed these same problems as less acute, placing them at only the "slightly severe" or "moderately severe" (J, K) levels.

Migration-related challenges are perceived as moderate in both areas; however, respondents view the situation in Vojvodina as less critical in this respect. A similarly consistent pattern emerges in the assessment of gender imbalance and distorted age structures, which were identified as "slightly" or "moderately severe" obstacles in both regions. Notably, indicators, such as infant mortality and overpopulation (overpopulation emerges as a key contemporary issue primarily in relation to the social dynamics of ethnically mixed populations and the capacity constraints of existing settlement infrastructure), remained in the minimal or negligible categories across both sample areas, suggesting that the focal point of crisis perception is not basic health conditions but rather structural population decline and the weakening of the generational chain.

Results of correlation analyses

The system of statistical correlations reveals deep, region-specific relationships between demographic structure and economic background, pointing to fundamentally different crisis mechanisms on either side of the border. In the Hungarian study areas (Kisújszállás–Karcag), the structural crisis is primarily characterized by a deficit in biological reproduction and the dominance of natural decrease (70–75%). This is supported by the strong relationship between natural decrease and the decline of the economically active population ($r = 0.825$), as well as by the extreme negative correlation between population ageing and population change ($r = -0.95$). In more urbanized centres, the correlation between population density and migration-related challenges ($r = 0.877$) indicates that the core problem is not depopulation per se, but rather the social integration of in-migrating populations and the growing pressure on local service systems.

By contrast, in the Vojvodinian study areas (Bácskossuthfalva–Pacsér), a classic peripheral depopulation spiral is at work, in which selective migration accounts for the bulk of population loss (approximately 60%). The out-migration of the working-age population–particularly young men–directly accelerates population ageing ($r = 0.794$) and distorts gender ratios ($r = 0.706$). Peripheral vulnerability is further intensified by the strong association between low population density and lower life expectancy ($r = 0.872$), indicating structural limitations in healthcare provision and service quality.

One of the study's key findings is the direct link between economic capital and demographic resilience. The significant positive correlation between the share of the child population and income levels ($r = 0.90$) confirms the protective effect of economic diversification. While Karcag's industrial base and institutional infrastructure provide relative stability (rejuvenation index: 73), high economic uncertainty and the prevalence of informal employment in the Vojvodinian periphery ($r = -0.45$) undermine family formation and weaken prospects for the intergenerational transmission of identity.

Analytical framework: demographic thresholds and identity reproduction

To interpret the relationship between demographic change and identity sustainability, the study applies an analytical framework based on two interrelated concepts: critical demographic mass and conscious identity.

Critical demographic mass is the minimum population needed for a community to sustain itself. Below this threshold, cultural and biological renewal becomes impossible. Once a com-

munity crosses this threshold, demographic and cultural erosion tend to follow a path-dependent and largely irreversible trajectory in the absence of substantial external intervention. In the present study, indicators such as the standardized population index, rejuvenation index, dependency ratios, and migration balance jointly serve as empirical proxies for identifying proximity to, or transgression of, this threshold.

Conscious identity is a deliberate effort to maintain heritage through institutions. It emerges when traditional family-based socialization weakens due to demographic decline. In this phase, identity maintenance increasingly relies on deliberate institutional practices, symbolic representation, organized cultural transmission, and policy-supported community frameworks. Conscious identity does not replace demographic reproduction; rather, it functions as a compensatory mechanism aimed at slowing identity erosion and maintaining community cohesion under conditions of structural population decline.

Contrast between Structural Potential and Actual Demographic Performance

The trajectories of the studied settlements show that rural demographic processes do not follow a linear decline but instead organize into distinct resilience and collapse pathways shaped by discrepancies between structural potential and actual population dynamics.

Karcag: Benefiting from its regional central role and diversified industrial base, Karcag has followed a more stable, overperforming trajectory than expected, confirmed by targeted state development funds after 2010 and a relatively high youth index (73).

Kisújszállás: Its urban institutional system (e.g., high schools) and cultural network have successfully slowed demographic erosion, resulting in a maintained resilience trajectory relative to its structural endowments, although natural population decline now threatens the generational chain in the long term.

Bácskossuthfalva: Despite significant Greater Cumanian (Nagykun) cultural capital and a previously robust community base, geopolitical shocks (wars, outmigration) have forced the settlement onto an underperforming, declining trajectory, with population loss (-28.3%) exceeding the retention capacity of internal community resources.

Pacsér: Its peripheral location and agrarian dominance have placed it on a critical shrinking trajectory, where the lack of structural opportunities has pushed the population index below 50, endangering the physical foundations of identity transmission.

These results go beyond the individual case studies. The strong correlation between demographic and institutional variables suggests that the sustainability of rural identity is not an autonomous cultural process but a structurally determined mechanism of social reproduction. The cases indicate that some rural communities do not experience gradual decline but rather collapse trajectories driven by threshold effects.

Discussion. The results provide strong empirical evidence supporting both hypotheses. Cross-border analysis reveals that demographic trajectories differ substantially: peripheral, agrarian-dominated settlements in Vojvodina experience faster population decline, accelerated ageing, and a more pronounced disruption of intergenerational continuity compared to economically diversified small towns in Hungary. These trends, driven by selective out-migration of the young and economically active population, fully support H1 and align with international research on migration-driven rural shrinkage. Furthermore, structural factors–economic diversification, higher settlement hierarchy, and institutional density–play a decisive role in shaping resilience. Supporting H2, the data shows that broader economic bases and stronger institutional presence in Hungarian settlements act as buffers, facilitating the intergenerational transmission of local identity.

The evidence underscores that demographic resilience and cultural continuity are mutually reinforcing processes. Interpreted through the lens of critical demographic mass, Vojvodinian settlements appear to be approaching or crossing the threshold where declining reproductive cohorts undermine the conditions for

natural cultural reproduction. In contrast, Hungarian small towns remain above this threshold, though they face increasing strain. Under these conditions, the emergence of conscious identity represents a necessary adaptive response rather than a voluntary strategy. As family-based socialization weakens, institutionalized forms of memory and education become central to community continuity. However, conscious identity serves only as a partial buffer; without a stable economic base to ensure population retention, even robust institutional practices face structural limits. Ultimately, local cultural sustainability remains inseparable from the demographic and economic realities of the settlement.

Conclusions. Beyond the specific findings regarding Greater Cumanian (Nagykun) settlements, this research has broader academic implications. The study contributes to the international literature in three key ways: It proposes an integrated demographic–identity relational model that operationalizes the link between population structure and cultural reproduction. It empirically demonstrates that the sustainability of cultural identity depends not only on institutional factors but also on demographic threshold conditions. Through a contrastive, cross-border case study, it shows that even with a shared cultural background, differences in settlement hierarchy and geopolitical context result in structurally divergent demographic trajectories.

Our statistical and qualitative findings jointly confirm that demographic structure and settlement-hierarchy position together shape the sustainability of identity. Preserving Greater Cumanian (Nagykun) identity is not just a cultural choice; it is a direct function of the community's physical reproduction capacity. While the functional diversity of Hungarian small-town centres provides relative resilience, rural shrinkage in the Vojvodina periphery is already threatening the foundations of collective memory. The statistical and qualitative findings of this research jointly demonstrate that the sustainability of the Greater Cumanian (Nagykun) identity cannot be interpreted as a purely cultural or symbolic issue, but must be understood as a direct function of the demographic structure embedded in broader socio-economic conditions. Identity persistence, in this sense, is inseparable from the material foundations of social reproduction.

The comparative analysis reveals a sharp cross-border divergence. Vojvodinian settlements are shrinking severely, with population indices below 50%. Extreme loss and rapid ageing have undermined the basic conditions for community survival. Historically stable until 1990, these settlements faced a "demographic emergency" triggered by post-socialist transitions, regional conflicts, and post-2010 EU-bound migration. In these contexts, the thinning of Greater Cumanian (Nagykun) identity is not merely symbolic but structural and potentially irreversible.

In contrast, the Hungarian study areas–Karcag and Kisújszállás–have experienced population decline at approximately half the rate observed in Vojvodina. Their urban status, diversified economic structures, and historically embedded institutional systems (secondary education, cultural networks, local administration) have functioned as partial buffers against demographic collapse. By retaining approximately three quarters of their historical population, these towns continue to provide a viable–though increasingly fragile–mass base for the intergenerational transmission of Greater Cumanian (Nagykun) traditions and collective memory.

Beyond the empirical comparison, the study introduces two interrelated conceptual contributions with broader relevance for international rural and demographic research.

First, the findings empirically substantiate the existence of a *critical demographic mass*. This concept refers to a population threshold below which natural demographic reproduction and spontaneous intergenerational cultural transmission are no longer viable. Once a community falls below this critical mass–due to cumulative ageing, selective out-migration, and declining fertility–the loss of population and identity becomes structurally self-reinforc-

ing and largely irreversible under market-driven conditions. The Vojvodinian settlements examined in this study appear to be approaching, or already to have crossed, this threshold in some dimensions.

Second, the analysis identifies the emergence of a phase of *"conscious identity"* as a necessary adaptive response under conditions of structural demographic decline. When identity can no longer be reproduced implicitly through family socialization and everyday community life, its survival increasingly depends on deliberate institutional support, symbolic practices, and organized community action. Cultural institutions, education, commemorative practices, and locally embedded identity policies become essential compensatory mechanisms. However, the study also demonstrates that conscious identity alone is insufficient without an accompanying economic base: economic diversification and local employment opportunities remain indispensable for stabilizing population retention and sustaining identity-bearing communities.

From a temporal perspective, the capacity for identity transmission can be divided into three broad phases:

(1) a pre-1960s period of *natural reproduction* and *implicit identity transfer*;

(2) a rupture phase beginning in the 1990s, characterized by *economic destabilization* and *mass out-migration*; and

(3) the current era of conscious identity, in which demographic indicators increasingly undermine community reproduction and require targeted intervention.

The broader implication of this research extends beyond the Greater Cumanian (Nagykun) case. By conceptualizing identity sustainability through the lenses of critical demographic mass and conscious identity, the study offers a transferable analytical framework for understanding the limits of demographic resilience and cultural reproduction in shrinking rural and peripheral regions across Europe. Cultural preservation policies alone are insufficient. To succeed, they must be combined with economic development and strategies to retain the local population. The study shows that the effectiveness of transgenerational identity transfer is directly proportional to a settlement's economic retention capacity. The relative resilience of Karcag and Kisújszállás demonstrates that urban functions and institutional infrastructure form a "protective shield" around the Greater Cumanian (Nagykun) heritage. In contrast, in the Vojvodina case study areas, identity has fallen into a "demographic trap": mass outmigration has removed not only the workforce but also the carriers of collective memory from the region.

In conclusion, while Hungarian Greater Cumanian (Nagykun) small towns still retain a diminishing but functional demographic base, the Vojvodinian settlements examined have reached a critical juncture. Without targeted economic and identity-strengthening interventions, the next decades may witness the irreversible erosion of Greater Cumanian (Nagykun) self-consciousness as a lived community reality. The study thus underscores the urgency of proactive, structurally informed policies to safeguard both demographic viability and cultural heritage in cross-border rural regions.

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