

DEMOGRAPHIC CHANGES IN POST-STATE FARM LOCALITIES IN POLAND

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ABSTRACT: The article presents research results conducted in specific localities, different from the rest of the country, where State Agricultural Farms (PGR) operated after World War II. The main objective of the presented research was the demographic transformations between 1950 and 2021 in so-called ‘post-state farm localities’. As a result, an analysis of population changes between census periods covering 71 years was carried out. Then, based on the constructed scheme, the course of the path dependence between the feminisation coefficient and the old-age index for the studied post-state farm localities was examined. It concerned the dynamics of population changes in 1950–2021, specifying two periods—the operation of PGR and the period after their liquidation; these changes were compared to the processes observed in Poland. The research showed that the functioning and liquidation of State Agricultural Farms impacted population changes in the localities in which they operated. It was found that post-state farm localities were characterised by higher dynamics of population changes than Poland’s average. After PGR liquidation, the rejuvenation of the demographic structure through the influx of the young population during the period of PGR operation translated into a dynamic aging process and unfavourable changes in the population structure by gender in post-state farm localities. These unfavourable changes occurred primarily in those post-state farm localities for which a population decline of more than 20% was recorded between 1950 and 2021.

KEYWORDS: post-state farm localities, demographic changes, system transformation, path dependence concept, Poland

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Introduction

After the Second World War, the Iron Curtain divided Europe into the blocs of two different political and economic systems. The countries of Central and Eastern Europe found themselves in a bloc of socialist states. The building of socialism was considered an end in itself, and the changes in these countries were politically

rather than economically motivated (Orażem 1989). Agriculture and industry played a key role in the economy as a means of wealth creation, while services outside of international tourism were poorly valued (Turnock 2003). Agriculture was organised along the lines of a centrally planned economy, with a pervasive system of administrative orders (Lerman et al. 2004). Large-scale collective farms played an important role

in the agricultural policy pursued. This was because, under socialism, the land was a common good and, thus, should not be in private hands (Davidova, Thomson 2014). As a result, the agricultural system was shaped comprising a socialised sector (state-owned farms, production cooperatives, and agricultural rings) and a non-socialised sector (individual farms) (Rudnicki 2001, Bański 2017a, b, 2018, Gwiaździńska-Goraj 2023). However, the relationship between the two sectors varied because of the complicated political situation of the Central and Eastern European (CEE) countries (loss of independence, uprisings, wars), the late abolition of feudalism, and the implementation of related reforms (Sroka 2015). Most governments of socialist countries tolerated a certain level of individual farms. Thus, in the former Czechoslovakia and Romania, almost (>90%) of all agricultural land came under state management in one way or another (Aligica, Dabu 2003). In contrast, in Poland and the former Yugoslavia, large-scale collective farms never reached such prominence, and their agriculture remained primarily based on individual farms (Pine 1995, Lerman et al. 2004, Hartvigsen 2013, Bański 2017a, b, 2018, Bański, Mazur 2021).

In 1989, the CEE countries embarked on the remarkable transformation from a centrally planned economy to a market economy (Hartvigsen 2014), characterised by varying speed and scope (Grykień 2005, Bański 2017a, b). Some countries carried out land reform in the mid-1990s, others were in the process, and several did not take any significant steps in this regard (Buckwell et al. 1997, Lerman et al. 2004, Hartvigsen 2014, Bański 2019). Approaches to land reform and land privatisation varied from country to country and were implemented at different times (Kovács 2003, Bański, Bednarek 2008, Vidican 2009, Csátori et al. 2019, Lennert, Farkas 2020). Generally, state-owned agricultural land was either returned to former owners (especially in countries where private agricultural land was confiscated in the late 1940s) or distributed to the rural population. Poland, Hungary, Albania, Kosovo, and the western regions of Ukraine and Moldova were exceptions to this general rule (Hartvigsen 2014). The structural changes significantly affected socio-economic status (Bański, Kamińska 2022). At the beginning of the transition, the labour markets in the former centrally planned economies

of Central and Eastern Europe were characterised by full employment and an excess of labour demand over the supply (Nesporova 2002). The surge of mass unemployment, unknown in previous periods, quickly became a serious social and economic problem in the transforming economies of Central and Eastern Europe (Burda 1993, Timár 1995). Another worrying aspect of unemployment was its long-term nature and the disproportion in its spatial distribution, resulting from the concentration of production in large enterprises. In addition, this effect was reinforced by the low population mobility. Consequently, the quality of labour supply in the affected regions deteriorated further (Nesporova 2002). Some areas became affected by poverty and social exclusion.

Another determinant of structural change in the CEE countries was their accession to the European Union (EU), the possibility of benefiting from the programmes of the member countries (Sroka 2015), and the opening of labour markets for citizens of Central and Eastern Europe by the old EU countries. Since 2004, it is estimated that almost 80.4 million citizens of the described region have emigrated (temporarily and permanently) from the new EU countries to the old EU countries. The economic restructuring of these countries, associated with their accession to the Community, has resulted in the dynamic development of the service sector, an increase in the importance of small- and medium-sized enterprise sectors, and ownership transformations assisted by the inflow of foreign capital. In the process of catching up with their development, they managed to reduce specific problems, including reducing unemployment, inflation, or the cost of raised capital, increasing the level of foreign exchange reserves and productivity measured as GDP (gross domestic product) per capita (Redo 2016). After accession to the EU, a relatively weak regional convergence could be observed in Central and Eastern Europe, which was the result of the different paces of individual countries' development. The faster growth in the economy mainly concerned the less developed countries (Baltic countries – the fast pace of development related to the liberalisation of their economies; Bulgaria, Romania – were catching up due to the delayed start of restructuring processes). In the majority of countries (including Poland), a

tendency to polarise development processes was observed, with simultaneously emerging growth areas (mainly capital city metropolises) and problem areas, characterised by very low growth rates or economic stagnation. As a rule, these were agricultural regions, especially those located at the external eastern border of the EU (Smętkowski, Wójcik 2009). As demonstrated, post-socialist rural restructuring and membership in the EU had many qualitative and quantitative change dimensions, each with its dynamics. Overall, between 2004 and 2023, economic development in Central and Eastern Europe was, on average, twice as fast as in the EU. Despite the ability to achieve the highest relative GDP growth rates, these countries fared less well in the face of some negative external shocks, e.g., the global financial crisis (2009–2014), when the average growth rate in the CEE countries was lower than in other EU economies. An exception to this general pattern was Poland, which not only avoided the 2009 recession but also achieved the highest (apart from Malta) average GDP growth rate in the EU during this period.

The briefly discussed socio-economic, cultural, and political change processes in post-socialist countries have affected rural localities and populations in diverse and challenging ways (Kay et al. 2012). Therefore, the authors sought to highlight this diversity. In pursuing the research objective of analysing demographic change in post-socialist localities, it was helpful to formulate the following research questions:

- In which direction has the population changed?
- What were the spatial dynamics of the population?
- How have population changes affected the age and gender structure of the population?
- Can areas with similar demographic processes be identified?

Then, an attempt was made to construct a path dependence between the feminisation coefficient and the old-age index for the studied post-state farm localities in relation to the dynamics of population changes in 1950–2021, specifying two periods – the functioning of State Agricultural Farms (PGR) and the period after their liquidation, and to compare these changes with the processes observed in Poland.

Theoretical background

A special role in the context of the creation and consolidation of a new agricultural system was played by the process of settlement and management of the so-called Recovered Territories, which after World War II in 1945, by virtue of the provisions of the Potsdam Conference, were allocated to Poland. The new political borders caused an exodus of the German population, including landowners. The lands incorporated into Poland were distinguished by a favourable farm size structure, in which agricultural estates of >100 ha accounted for as much as 32.9% of the total agricultural area (Dziurzyński 1983). Agricultural land from abandoned post-German estates was incorporated into the State Land Fund (PFZ), and a campaign was launched to manage it. The agrarian policy pursued in these areas was closely linked to the consolidation of the new agricultural system (Rychlik 1974, Strużek 1974, Cholewa, Ostrowski 1976). As a result, on the basis of the pre-war agrarian structure, the core of state farms was formed (Rudnicki 2001, Gwiaździńska-Goraj 2023). In 1949, the total area of State Agricultural Farms was 1,871,000 ha. By 1988, it had increased to 4,043,000 ha, with the farms mainly concentrated in northern and western Poland. In the remaining part of the country, the share of State Agricultural Farms' agricultural land did not exceed 10.0%, as a rule (Fig. 1).

At the same time these areas saw a resettlement action. Before the war in 1939, the population living here accounted for almost 8.9 million people, and after World War II in 1946 it decreased to 5.0 million (Kosiński 1963) (Fig. 2). Mass migration movements have had a significant impact on population growth and population structure by sex and age (Litterer 1955, Gruchman, Ziółkowski 1960, Jelonek 1960a, b, Kosiński 1963, 1967, 1968). The immigrant population, which accounted for approximately 78.3% of the total population (Olechnowicz 1947), was not connected to their place of residence or the community in which they lived. This population included displaced persons from the Eastern Borderlands (pre-war Polish lands lost to the USSR), repatriates (returning to the country after being forcibly resettled to other countries during the war), and settlers from Central Poland (Ziółkowski 1959, Kosiński 1960, Dulczewski 1964, Eberhardt 2000).

As noted by Robert Hay (1998), people born in a particular place showed a stronger sense of belonging to that place than those who had lived there longer but moved there later in life. Attachment to the place of residence is understood as bondedness (Hay 1998), rootedness (Tuan 1980, Hay 1998). In the so-called Recovered Territories, this relationship between man and place of residence and a sense of belonging to a community was extremely important in relation to the demographic and social processes taking place (Tomaszewski 1958, Dulczewski 1961, Brencz 2002). Among the reasons for living in the Recovered Territories, a relatively easy employment in State Agricultural Farms was very appealing. It is worth noting that during the period of the socialist economy, state farms were placed in a privileged position. Their employees were guaranteed housing and the benefits of an extensive welfare system (Ignar 1986, Halamska 1999, Koral 2013). An important motive for taking a job there was also the chance of social advancement. The crews were composed of poorly educated

people, usually also with low career aspirations (Mycielska 1966, Ignar 1974, 1986, Dzun 1987). In the public perception, PGR workers epitomised numerous negative traits: drunkenness, sloppiness or disrespect for social property (Mydlak 1986). As a result of these processes, a society formed in the Recovered Territories was demographically and socially diverse (Markiewicz 1966, Głębocki 2005, Szpak 2005).

The period of political transformation initiated in the 1990s brought about profound changes in the way the socialised economy operated (Falkowski 1993, Głębocki 1998, 2005, 2006, Kulikowski 1999, 2004, Wilkin 2000, Jezierska-Thöle 2018, Głębocki et al. 2019, Poczta 2020, Runowski 2023). The liquidation of State Agricultural Farms, which began in 1992 under the Act on the Management of Agricultural Property of the State Treasury (of 1991), not only affected the agrarian structure but also left its social and economic mark (Kaczmarek 1999a, Rydz 2000, Dzun 2002, 2005, Zgliński 2003, Psyk-Piotrowska 2004, Stanny 2008). During the PGR liquidation (up to 1993), some 193,000

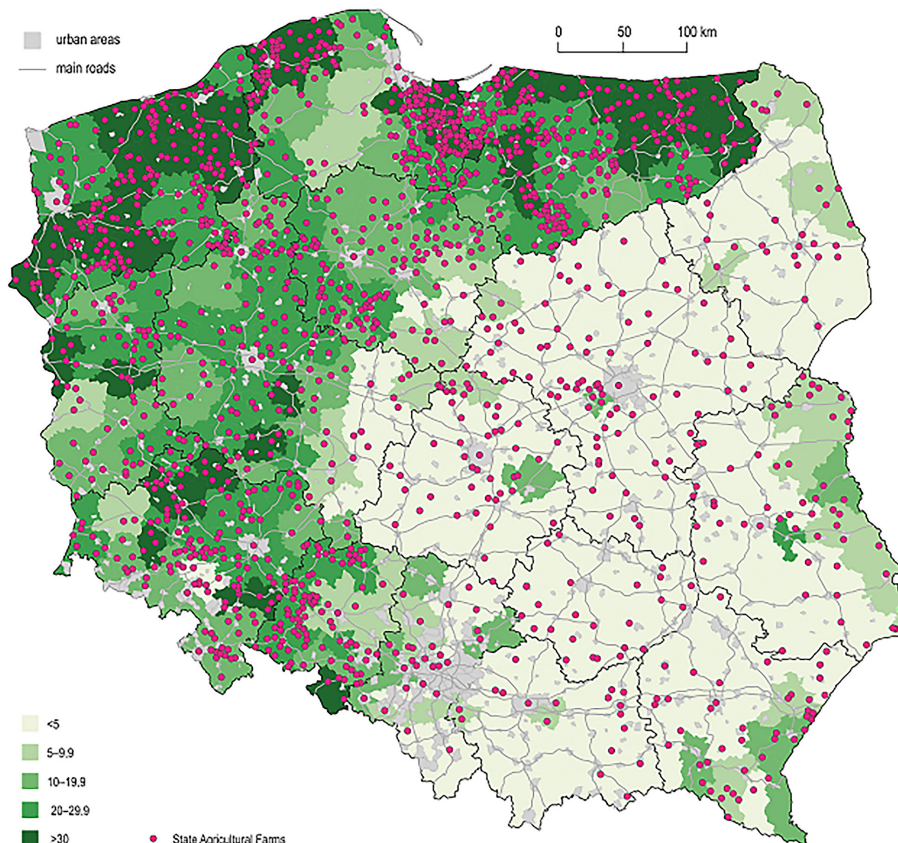


Fig. 1. Location of post-state farm localities in Poland and the share of the area of State Agricultural Farms (PGR) in 1988 based on Gwiaździska-Goraj (2023).
* data aggregated to the 1999 administrative division.

people, including their families, lost their jobs; around 500,000 people were deprived of their livelihoods. It was the post-state farm areas that had the highest share of unemployment and social problems (Tarkowska 1998, 2000, Kaczmarek 1999b, Niedzielski 2001, 2018, Karwacki 2002a, b, Czapiewska 2012). They resulted from the helplessness and passivity of former PGR employees, the lack of adequate education and the limited labour market in the area where they lived (Psyk-Piotrowska 1996, 1998, Wilkin 1997, Giza-Poleszczuk, Kościeszka-Jaworski 2008). The unemployment rate and duration among former PGR-employees were definitely higher and longer than in other sectors of the economy (Domańska et al. 2001). This situation reduced the population income level and became shortly an indirect cause of negative demographic phenomena. One theory that relates to the accumulation of unfavourable processes for development is Weber's negative development (2011). The triggering factor of joblessness was followed by multiple negative feedbacks, observed in post-state farm areas. The

pauperisation of the post-state farm community was further influenced by its social and spatial isolation. Therefore, when analysing demographic changes in post-state farm localities, one should also refer to location rent theory (understood as a certain profit from locating in a given place). These localities were in fact located – as Wilkin (1997) stated – often 'at the end of the world', in remote and economically underdeveloped areas. This was because poor communication accessibility of State Agricultural Farms, where access to basic services was provided, was not so important. However, after their liquidation it posed a serious problem. The residents, through limited mobility, were in a sense trapped in this space. This spatial dimension is emphasised in theoretical approaches to marginalisation related to the creation of specific enclaves associated with the accumulation of negative processes (Marks-Bielska 2005, 2006). In relation to post-state farm communities, they are referred to in the literature as 'enclaves of poverty' (Tarkowska 2006) or 'unemployment basins' (Szewc, Szewc 2001).

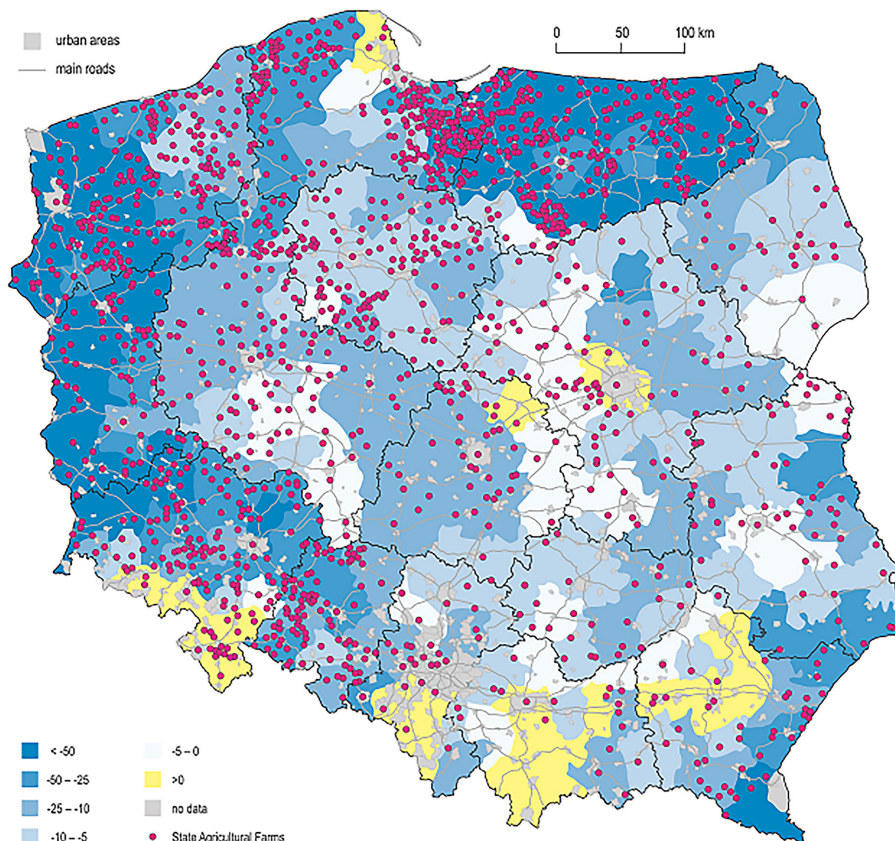


Fig. 2. Location of post-state farm localities in Poland and population changes between 1931/1933 and 1946 based on Wesolowska (2018).

* data aggregated to the 1999 administrative division.

The beginning of the system transformation in Poland coincided with the so-called second demographic transition (Van de Kaa 2002) and the resultant profound cultural and behavioural changes concerning such issues as parenthood, the role of the parent in raising children, the number of children one has, or the age at which a couple decides to have a child. Improvements in the quality of life and the availability of medical services have directly translated into life expectancy. As a result, there has been a dynamic increase in the number of older people in the population structure (so-called double ageing) (Maier 2016).

Poland's accession to the EU in 2004 was not insignificant for the changes in demographic processes (Jezierska-Thöle, Kluba 2012, Bański et al. 2021). The EU postulates of revitalisation and rural renewal began to be implemented, which contributed to an improvement in living conditions in rural areas, including post-state farm localities. New investments were made and public infrastructure was developed (Kocur-Bera 2011, Gostomczyk 2012, Hayn 2015, Czudec 2017). In addition, the opening of the EU's labour markets to its new members, generational change, and an increase in the education level of the population, influenced the professional mobility especially to English-speaking countries (Zborowski, Gałka 2008, Schwabe 2023). In 2013, the number of foreign emigrants was 32,103, while the number of immigrants was 12,199; as a result, the lowest balance of foreign migration was recorded. The consequence of the significant emigration of Poles of reproductive age has also affected the lower number of births in Poland.

The COVID-2019 pandemic, which spread worldwide, had an impact on the sharp increase in deaths in 2020 and 2021 (Kuropka et al. 2021). In Poland, more than 477,000 people died in 2020 and almost 520,000 in 2021 (42,000 more compared to the previous year). Despite such a high number of deaths, there was no improvement in the natural increase rate per 1000 population, which, after all, allows for the relationship between the number of births and deaths (Szukalski 2009, Gwiazda 2015, Baranowski 2017). On the other hand, the old-age index increased very dynamically and stood at 118.7.

Analysing the theoretical background that influenced demographic changes in post-state farm localities, it can be concluded that they are a derivative of many factors, the importance of which may change over time. Meanwhile, they remain in a dynamic interaction in this complex process.

Materials

The analysis of demographic change was conducted at the level of statistical localities¹. For the purposes of the research, the term 'post-state farm localities' was defined. Under this term we understand the localities where State Agricultural Farms functioned, which were the most important organisational form of socialised agriculture during their prosperity. The research area included 1565 post-state farm localities in Poland. Analysing their spatial distribution (Fig. 3), one can see their concentration in northern and western Poland, which results from historical conditions.

The idea was to investigate the long-term effects on demographic change in post-state farm localities. The research spanned from 1950 to 2021, making it possible to trace demographic processes over 71 years. The research results were presented for the period 1950–1988, characterised by the functioning of State Agricultural Farms, and for the period 1988–2021, associated with the liquidation of State Agricultural Farms (most state farms were liquidated in 1992 and the last ceased operating in 1995). The year 1988 played a spatial role in the research as it was a breaking point before the system transformation that was to follow. The data for the research were obtained from the National Censuses of Statistics Poland (1950, 1960, 1970, 1978, 1988, 2002, 2011, 2021). In order to present the results of the study for this long-time perspective, the administrative division applicable on 1 January 1999 was adopted. Therefore, for cartograms from earlier years, data were aggregated in this system.

¹ Statistical locality is a grouping of several localities for statistical purposes, usually comprising a village and its adjoining hamlets and other smaller localities, for which statistical data are collected and compiled in total (Online: www.stat.gov.pl, accessed 13 March 2025).

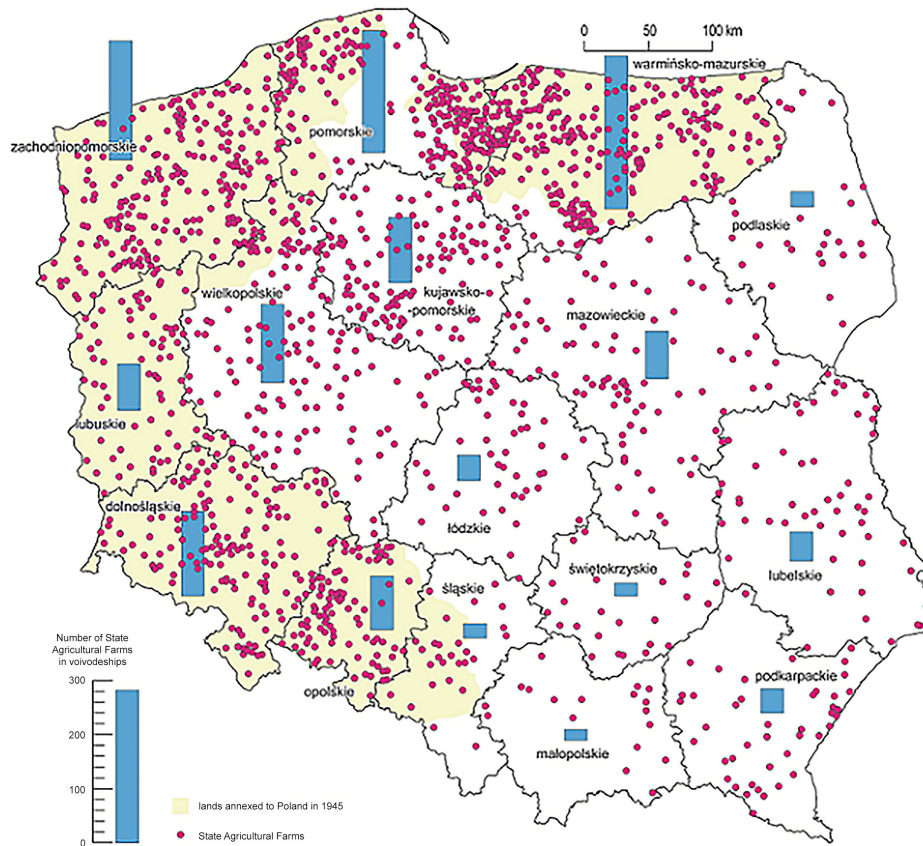


Fig. 3. Post-state farm localities in Poland according to the list of localities covered by decommissioned State Agricultural Farms (www.stat.gov.pl; accessed 6 December 2023).

* data aggregated to the 1999 administrative division.

Method

Demographic changes in post-state farm localities as well as the functioning and liquidation of State Agricultural Farms were investigated within the framework of the adopted research course, which consisted of the following research steps:

Step I: Statistical and spatial analysis of population changes, which was a two-stage process: the first related to the period of functioning of State Agricultural Farms (1950–1988) and the second related to the period of their liquidation along with the effects occurring in space in connection with this process (1988–2021). The analysis involved the study of population changes for the census years between 1950 and 2021. For this purpose, the dynamics of population changes within the above-mentioned periods and for the entire time interval (1950–2021) were examined. Subsequently, post-state farm localities were grouped by population chang-

es between 1950 and 2021, which provided a benchmark for changes occurring in their demographic structure by gender and age.

Step II: Statistical analysis of changes in the population structure by age and gender using the old-age index and the feminisation coefficient in post-state farm localities over the period 1960–2021.

Step III: Identification of the relationship between the population change between 1950 and 2021 in post-state farm localities and the formation of the population structure by age and gender in the period of 1960–2021. The assumptions of two concepts – ‘path dependence’ (Arthur 1989, 1994, David 2007) and ‘cumulative causality’ (Myrdal 1957), which formed the basis for the construction of the author’s scheme (Gwiaździska-Goraj 2023), played an important role in this analysis.

According to the concept of ‘path dependence’, the starting point, which gives direction

to the changes taking place, plays a special role in shaping the space. In the diagram presented, the starting point of 'path dependency' is the assessment for 1960. A significant change in the direction of shaping the rural space occurred in connection with the functioning of socialised agriculture, the effects of which were assessed in 1988. For the purposes of the diagram, this moment was defined as a breaking point of 'path dependency'. Subsequently, the effects of the spatial changes taking place in connection with the abolition of socialised agriculture were assessed consecutively for 2021, which was assumed to be the final point of 'path dependency'.

The adoption of such a long cyclical period for the study was necessary to compare the changes taking place and analyse the phenomena in terms of cumulative processes, in line with the concept of 'cumulative causality'. The 'path dependencies' of changes in the structure by gender and age, illustrated by the authors' diagrams, were outlined on the basis of their results in relation to the average size of the synthetic index for a given year. Based on the relationship between the mean and the standard deviation, four evaluation classes were distinguished: favourable, moderately favourable, moderately unfavourable, and unfavourable (Table 1). On the other hand, the 'path dependency' colour was assigned according to the colour given to the post-state farm localities, which was based on their population change between 1950 and 2021.

The adopted research design made it possible to illustrate how changes in the population structure by age and gender occurred in the analysed period, depending on the population change in post-state farm localities.

Table 1. Separation criterion for assessment based on Kaczmarek and Parysek (1977).

Separation criterion	Evaluation of size of indicator relative to its average size
$z_{xij} \geq x_j + \frac{1}{2}\delta_j$	favourable
$x_j \leq z_{xij} < x_j + \frac{1}{2}\delta_j$	moderately favourable
$x_j - \frac{1}{2}\delta_j \leq z_{xij} < x_j$	moderately unfavourable
$z_{xij} < x_j - \frac{1}{2}\delta_j$	unfavourable

z_{ij} – index size;

x_j – arithmetic mean of variable j ;

δ_j – standard deviation of variable j .

Results

The statistical analysis carried out in Step I of the research procedure showed significant differences in the dynamics of the population change between 1950 and 2021 in post-state farm localities in comparison with the average for Poland (Table 2).

The adopted identification of the locality in terms of a change in its population number was an important benchmark in the next research steps (cf. Figs 4–6). Between 1950 and 2021, population growth was clearly observed in post-state farm localities. Considering the changes in the population number in the period of functioning of State Agricultural Farms and after their liquidation, the direction of changes was opposite. Between 1950 and 1988, there was a dynamic population increase, whereas between 1988 and 2021, the population decreased (Table 2).

Changes in the population of post-state farm localities in the inter-census periods were characterised by different dynamics (Fig. 4). A significant population increase was recorded in 1950–1960 and it was related to the baby boom and also to the establishment of State Agricultural Farms in these localities. However, this population growth declined over time. In the period from 1970 to 1988 the population size did not change significantly within the adopted criterion. The closure of State Agricultural Farms in 1992 meant that the population lost their jobs and thus the attractiveness of living in post-state farm localities diminished. Initially, this process was slow and consisted of an increase in the number of localities with a relatively stable population, which rose to 65.8% between 1988 and 2002 and to 80.1% between 2002 and 2011. Poland's accession to the EU and the opening of its labour markets also had an impact on the results obtained. The highest population decline in post-state farm localities was recorded between 2011 and 2021, which overlapped with the general trend associated with the population decline. Post-state farm localities with more than a 10% decrease in the number of inhabitants accounted for 41.3%.

Analysing the spatial distribution of population changes during the period of 1950–1988, a similar trend was noted for all voivodeships (Fig. 5A). Generally, an increase in population was noted. The period of 1988–2021 looks

different, which means that a strong polarisation of post-state farm localities can be observed. Those located near urban agglomerations were gaining population, while those in peripheral areas were losing it (Fig. 5B).

Then, in Step II, changes in the population structure by gender and age were analysed (Table 3). Between 1960 and 2021, the old-age index increased in line with the general trend. However, this rejuvenation of the immigrant population in post-state farm localities clearly resulted in a more favourable size of the index compared to the average for Polish localities. This difference persisted throughout the analysed period, although it decreased significantly with time. The demographic, social, and economic conditions of a given area are significantly influenced by the structure according to gender. A particular problem is a shortage of women in

agricultural rural areas, where, for example, there has been a sharp imbalance of the sexes in the so-called matrimonial age, i.e. 20–34. Unfortunately, an indicator for this age group for the entire period under study was not available, so an overall figure was used. The feminisation coefficient for the whole analysed period in post-state farm localities was lower than the national average, and as the difference widened over time, the coefficient decreased, which may indicate a shortage of women in post-state farm localities.

From a research point of view, it made sense to carry out the identification of the relationship between the population change and the formation of population structure by age and gender in the period of 1960–2021, which was carried out in Step III. For this purpose, the differentiation of post-state farm localities based on the population changes between 1950 and 2021 was taken as a

Table 2. Population changes in localities between 1950 and 2021 based on census data.

Census interval	Localities with significant population growth		Localities with relatively stable population	Localities with significant population decrease	
	>20	20–10	10–(–10)	(–10)–(–20)	<(–20)
In post-state farm localities (%)					
1950/2021	66.9	5.2	12.1	5.4	10.4
1950/1988	72.5	7.3	11.8	4.4	4.0
1988/2021	14.3	5.2	34.3	22.7	23.5
Localities in total (%)					
1950/2021	25.2	4.7	13.5	9.4	47.2
1950/1988	22.6	7.1	22.2	14.3	33.7
1988/2021	15.2	6.6	26.5	19.5	32.2

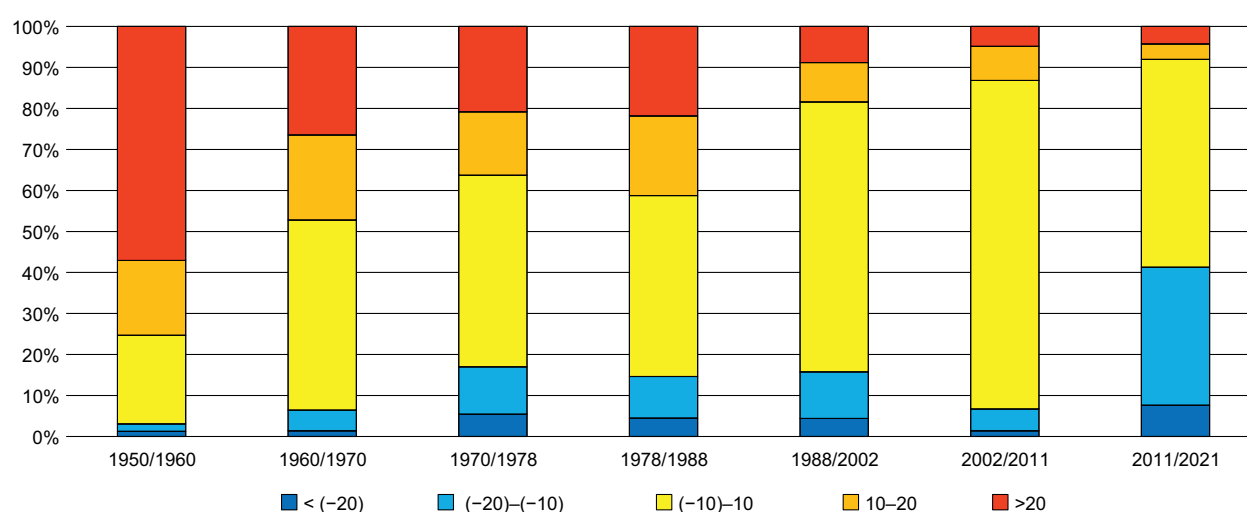


Fig. 4. Population changes in post-state farm localities between 1950 and 2021 based on census data.

* data aggregated to the 1999 administrative division.

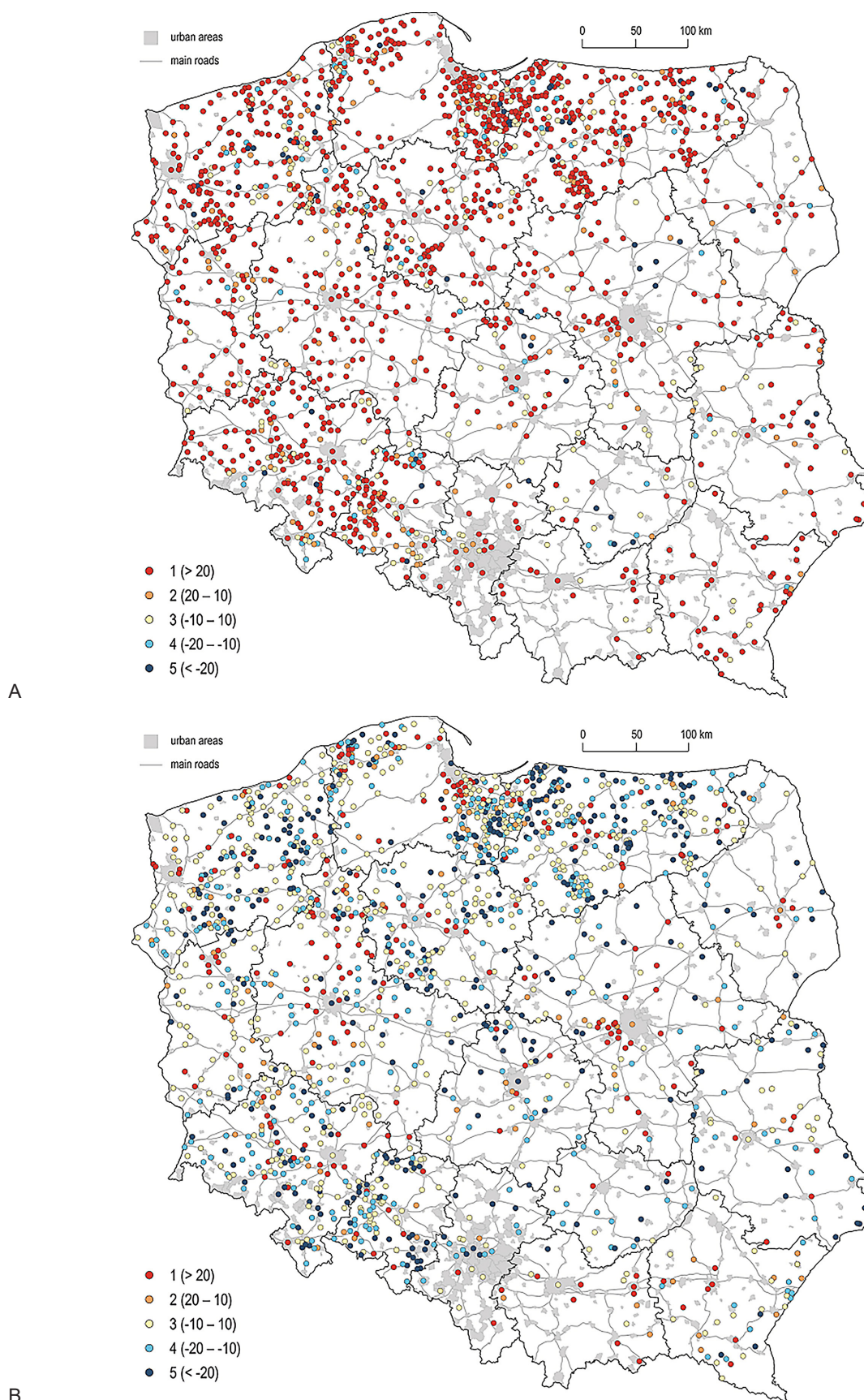


Fig. 5. Dynamics of population changes between 1950 and 1988 (A), and 1988 and 2021 (B) in post-state farm localities based on census data.

Table 3. Changes in the population structure by age and gender between 1960 and 2021 based on 1950–2021 census data.

Specification	Year						
	1960	1970	1978	1988	2002	2011	2021
old-age index*							
post-state farm localities	18.9	29.9	35.9	40.9	50.1	70.7	116.0
total localities	27.1	45.3	52.1	54.1	65.0	90.4	121.1
feminisation coefficient**							
post-state farm localities	107.1	102.5	101.2	100.3	100.9	100.4	100.3
total localities	109.2	105.9	105.3	105.1	106.5	106.6	106.7

* population aged 65+ divided by the population aged 0–14.

** number of women per 100 men.

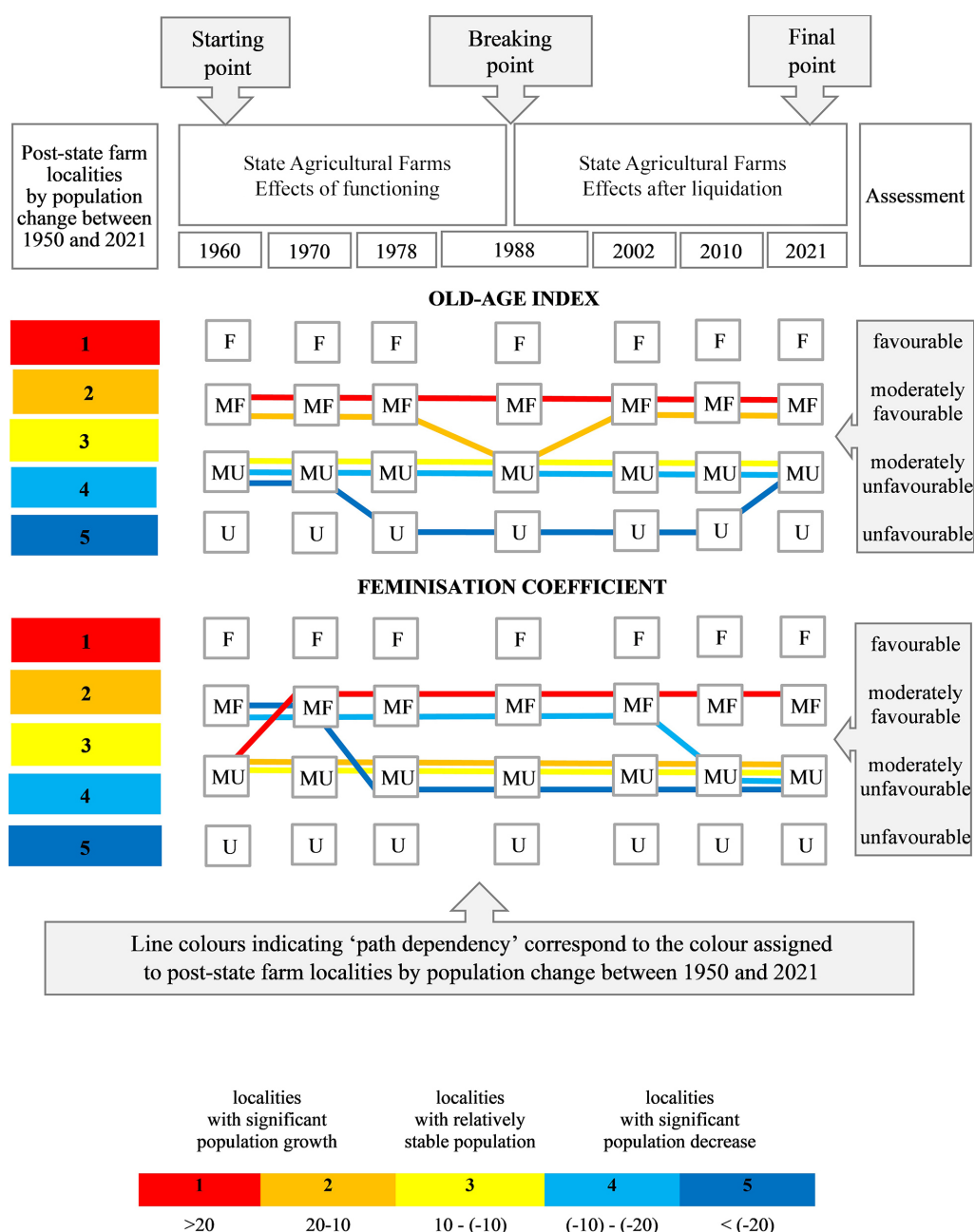


Fig. 6. 'Path dependency' in shaping the structure by gender and age in post-state farm localities by population change between 1950 and 2021.

reference point, and the path of dependence of the changes taking place was analysed separately for the old-age index and the feminisation coefficient (Fig. 6).

Analysing the 'path dependency' – the old-age index for post-state farm localities according to the dynamics of population changes in 1950–2021, the following dependencies were noted:

- starting point: relatively little variation in the assessment of the size of the old-age index in relation to the average size, indicating a widespread rejuvenation of the population structure in post-state farm localities. Nevertheless, when analysing the pathway, the higher the population growth, the more favourable the population structure by age was;
- breaking point: a much greater variation in the assessment of structure due to the population change is apparent, initiated as early as 1978 for localities with a population decline of >10%. In 1988, a moderately unfavourable assessment of the old-age index was also recorded for the post-state farm localities characterised by a population growth between 10% and 20%. However, a significant deterioration of the index was recorded for the post-state farm localities which had a population decline of >20%. The increase in this indicator is indicative of the most advanced ageing process associated with the outflow of young people;
- final point: the year 2021, i.e. >30 years after the process of liquidation of State Agricultural Farms, which began in 1992. While the localities with a population growth of 10%–20% saw an improvement in the old-age index relatively quickly after 1988, in post-state farm localities with a population decline of >20%, the unfavourable index persisted until 2011. In contrast, its improvement in 2021 was due to a higher death rate.

Analysing the course of the 'dependency path' – the feminisation coefficient for post-state farm localities according to the dynamics of population change in 1950–2021, the following dependencies were noted:

- starting point: relatively small variation in the assessment of the size of the feminisation coefficient in relation to the average size, the higher the population growth the lower the coefficient;

- breaking point: the changes were insignificant enough; the feminisation coefficient was between a moderately favourable and a moderately unfavourable assessment. It is also difficult to find a significant relationship related to population change;
- final point: when comparing the assessment of the feminisation coefficient from 2021 to 1950, there was clearly a reversal. Post-state farm localities with an increase of >20% in population, which initially received the least favourable assessment, received the most favourable assessment at the end, and vice versa: localities with a decrease in population of >20%, which initially received the most favourable assessment in 2021, received the least favourable assessment.

Discussion

The scientific research carried out in this article focused on the demographic changes taking place in post-state farm localities. Referring to Eberhard's research (1989) on depopulating regions, a retrospective approach was adopted for the analysis. Generally, higher dynamics than the average for Poland characterise the observed population changes in post-state farm localities in 1950–2021. This is particularly true for 1950–1988, where >20% of population growth was recorded in >70% of the post-state farm localities and >20% of the localities. In this respect, Poland is an interesting case compared to other countries in Central and Eastern Europe, where the agrarian and settlement policies pursued were closely linked. After 1988, the recorded decline in population in post-state farm localities was part of the general trend of changes in Poland. However, it was characterised by higher dynamics, which may have resulted indirectly from the liquidation of PGRs. The larger community was not characterised by significant mobility, and spatial accessibility deteriorated with the liquidation of PGRs. The most significant decline in the population in post-state farm localities was from 2011 to 2021. The reasons for this state of affairs can be seen in the emigration of young people in search of better living conditions after the opening of the Schengen zone (however, limitations in the data availability made it impossible to be confirmed)

and in the high mortality of the old population who arrived here immediately after the war, as part of the action to settle the so-called Recovered Territories.

In post-state farm localities in 1950–1988, the dynamics of population change in the spatial pattern were similar, which answers the second research question posed by the authors. Localities with a high rate of population change, above 10% (about 80%), dominated. In contrast, in the period after the liquidation of state farms, the spatial picture of population change was more varied. Nearly half of the post-state farm localities saw their population decline by >10%. They were located mainly in Warmińsko-Mazurskie and Zachodniopomorskie Voivodeships. Localities with population growth were located in the zones of influence of large Polish cities. This picture is consistent with the noticeable demographic changes in Poland, namely with population shifts from the periphery towards the centres (Bański 2005, Halamska 2011, Rosner, Wesołowska 2020). The location of individual villages, growth centres, national borders, and important transport corridors is one of the most important factors that shape rural space (Kamińska 2010, Heffner 2011, Rosner 2011, 2012). The unfavourable geographic location with which we are confronted in the case of a significant number of post-state farm localities (Wilkin 1997, Psyk-Piotrowska 2001, Marks-Bielska 2005, Karpińska 2021) is a barrier to socio-economic development. Peripherality, a multidimensional phenomenon evaluated pejoratively, has an impact on a population decline and unfavourable processes in human capital resources (Miszczuk 2010, Gorzym-Wilkowski 2014).

The application of the adopted path dependency solution allowed answering another research question, which showed changes in the feminisation coefficient and the old-age index for the post-state farm localities against the dynamics of population changes between 1950 to 2021. The old-age index and the feminisation coefficient for the entire analysed period in the post-state farm localities were lower than the average values for localities in Poland. Some relationships were observed when analysing the changes in structure by gender due to population changes in the studied localities. Thus, regarding the old-age index, it was found that the localities with population growth between 1950 and 2021

recorded the most favourable figure for this index; the more significant the decrease in population occurred, the less favourable figure was recorded for this index. At the same time, while the variation from the average size of the post-PGR villages was relatively small for both 1960 (the starting point) and 2021 (the final point), it was more varied between 1970 and 2010. In particular, the condition is evident in 1988 (the breaking point before the restructuring), in which its distribution shows signs of polarisation. The feminisation coefficient was characterised by less variation throughout the analysed period. However, interestingly, in the context of the research conducted in 1960, it was in the localities for which a decrease in the population was recorded that its magnitude was more favourable. In 2021, on the other hand, polarisation is visible, with the most favourable magnitude recorded for the localities in which there was a population increase and the least favourable in other cases. This confirms that the post-PGR localities face a shortage of women in the population structure, which may adversely affect their future population potential.

Conclusion

The conducted research demonstrated that the functioning and liquidation of state farms had an impact on population changes in the localities where they operated. The population increase in 1950–1988 and its decline in 1988–2021 in post-state farm localities were generally characterised by higher dynamics than the average for Poland. However, this rejuvenation of the demographic structure through the influx of the young population during the period of state farms operation translated into a dynamic ageing process and unfavourable changes in the population structure by gender after the PGR liquidation. The authors believe that the proposed research procedure has significantly broadened and enriched the existing scientific body of research concerning demographic changes in post-state farm localities.

An interesting extension of this research could be comparing the demographic changes in other countries having state farm schemes, where the introduction of changes to the agricultural system was not so closely linked to the parallel settlement policy.

The research investigation, the answers to the questions posed, and the conclusions constructed can help planners and local government representatives implement dedicated social policies in areas characterised three decades ago by a socialised economy and now facing many demographic and social problems.

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Authors' contribution

MG-G: conceptualisation, methodology, formal analysis, investigation, writing – original draft, writing – review & editing, visualisation; MW: conceptualisation, methodology, data curation, formal analysis, investigation, resources, visualisation, writing – original draft, writing – review & editing; AJ-T: conceptualisation, formal analysis, investigation, writing – original draft, writing – review & editing.

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