

TRENDS IN HUMAN CAPITAL FORMATION AND EVALUATION OF THE INTERCONNECTION OF SOCIO-DEMOGRAPHIC PROCESSES IN RURAL AREA: A CASE STUDY OF VOLYN REGION, UKRAINE

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Abstract

A comprehensive analysis is relevant for present realities for Volyn and Ukraine as a whole, the problem - the demographic situation in rural areas, including reducing the number of a rural population due to natural processes of reproduction. The features of the rural settlement network. Democratic reproduction processes for the rural population for 1989 – 2018, its regional features and patterns of the settlement are analyzed. Based on the study of this phenomenon, methods of studying the influence of various demographic factors on the dynamics of rural demographic reproduction have been proposed. The article proved that the demographic situation and the possible appearance of threats to demographic processes in the future depending on the formulation and implementation of effective population policies today. Found that targeted regulatory impact on the demographic situation should be based on a comprehensive understanding of the nature of demographic processes reproduction.

Key words: rural population, rural area, average rural population, human capital, correlation ratio

INTRODUCTION

One of the key roles in ensuring sufficient impact social and economic transformation, the implementation of labor potential play-purpose social and demographic features of the population, particularly the trends that dominate in the development of quantitative and qualitative characteristics of the rural population as an integral component. After all realities prospects for economic development largely depends on the effective solution of social and demographic issues, including optimizing the structure of the population and creating favorable conditions for full implementation of human potential in the countryside.

The results of specialized studies conducted in the most developed countries on econometric models show that the internal demographic situation, the mode of reproduction of the population, its quantitative and qualitative

composition can either stimulate or hinder the social and economic development of the country, affect the prospects of labor security and implementation of economic and social transformations [4].

Development of applied scientific, theoretical and methodological aspects of solving the multifaceted problems of effective functioning and sustainable development of rural communities in Ukraine dedicated to scientific work A. Alymov and V. Mykytenko cites by [7], V. Bakumenko [1], A. Boiar [3], E. Libanova cited by [6], O. Borodina and A. Popova [2], I. Tofan and O. Ahres cited by [12] and others. However, despite previous achievements and scientific and organizational achievements on the study abovementioned issues, the task of taking into account socio-demographic aspects of rural communities in Ukraine on the principles of sustainable development and ensure human capital

formation require further economic and statistical analysis.

All of the foregoing causes particular relevance study modern trends in social and demographic processes in rural areas and ways of scientific research of their mutual interdependence, which is the purpose and the objectives of the article.

MATERIALS AND METHODS

We think that the methodological prerequisite for development and implementation of measures for the progressive development of the reproductive capacity demographically-village is especially meaningful definition features of the current demographic situation and outlining the cause-effect factors of its formation. Research objectives abovementioned problems seen in materials Ukraine Volyn region.

Grouping by factors whose impact is studied, allows to spread the total variation resultant variable dispersion into two, one of which is determined by the variation of influence factors underlying grouping, and the second – a variation, due to the influence of all other factors also being studied. Therefore, according to the rule of adding the variances for the quantitative measurement of density communications used overall, intergroup and intragroup (residual) variance. Intra-dispersion (σ_i^2) is calculated using the formula:

$$\sigma_i^2 = \frac{\sum (y - \bar{y}_i)^2}{n},$$

where \bar{y}_i - the average effective signs of the group; n - the total number of units together; i - serial number of the group, $i \in [1; 3]$.

Thus, the average intragroup variance which determines the variation caused by the influence of all other factors except the grouping is calculated by the formula:

$$\bar{\sigma}^2 = \frac{\sum \sigma_i^2 \cdot f_i}{\sum f_i},$$

where f_i - the frequency inherent in each of the groups factor variable [13].

Inter-group variance (δ^2), which measures the variation caused by the influence of factors underlying grouping – the average population of villages is calculated by the formula:

$$\delta^2 = \frac{\sum (\bar{y}_i - \bar{y})^2 \cdot f_i}{\sum f_i},$$

where \bar{y} - the average value of resultant variable across the population.

By dividing each of the terms of the rules dispersions adding to the total variance (σ_{tot}^2), Transform it into the following expression:

$$1 = \frac{\bar{\sigma}^2}{\sigma_{tot}^2} + \frac{\delta^2}{\sigma_{tot}^2},$$

The first term $\frac{\bar{\sigma}^2}{\sigma_{tot}^2}$ - shows

what proportion of the total variation is due to the effect of non-grouping features; a second term $\frac{\delta^2}{\sigma_{tot}^2}$ called the coefficient of determination ($\eta^2 \in [0, 1]$) – shows the degree of variation resultant variable under the influence of factors underlying the grouping.

The criterion of materiality and the coupling between the factor and efficient characteristics serves correlation ratio (η), ie the relationship between attributes considered quite significant:

$$\eta = \sqrt{\frac{\delta^2}{\sigma_{tot}^2}}, |\eta| \in [0, 1].$$

Note that if the correlation ratio different from zero ($\eta > 0$), then this may not be sufficient evidence of the correlation between signs. To assess the reliability criterion used correlation characteristics Fisher (F-criterion):

$$F = \frac{\delta^2}{\sigma^2} \cdot \frac{k_2}{k_1},$$

where k_1, k_2 - degrees of freedom.

The work is based on the analysis and evaluation of the results of the analysis of statistics State Statistics Service of Ukraine and Volyn contained in statistical databases [8, 10, 11].

RESULTS AND DISCUSSIONS

Note that the largest population in the Volyn region seen in 1994 - 1,081.8 ths. people. And

the proportion of the rural population in the total population was 49.0% [10].

It should be noted that in the absence of further guidance to the source, all the evidence presented and calculated by the author based sources [10, 11]. 1989- 2018 except for minor increases in 1994 and in 2014 there is a systematic reduction of farmers on average annually by 1.6 thousands people. As a result, the test period permanent rural population decreased by 27.9 thousand people or by 5.1% and at the beginning of the 2018 year amounted to 516.5 thousand people. (49.8% of the resident population of Volyn), among which 52.4% were women (1,000 men accounted for 1,100 women). In terms of areas for 1989-2018 the most intensive continuous decrease observed in rural Turiyskyyi - 14.0% Starovyzhivskyyi - 11.5% and Lokachynskyyi areas - by 8.5%.

The average population size of the village in Volyn in 1989 was 520 people, and in 2018 - decreased by 6.5% and amounted to 487 people - lower than the national average (527 pers.) - 7.6%. Density 100 villages km² area is 5.2 while the national average - 3.6. The average distance between villages - 2.5 km. However, in high enough diversity there defined indicators, including rural density ranges from 9.0 to 100 km² in Ivanychivskyyi area to 3.0 per 100 km² – in Manevytskiy. This diversity is evident and the average rural populations from 789 people. (799 pers. in 1989.) - Kamin-Kashyrskyyi in an area up to 255 people (301 pers. in 1989) – in Turiiskyyi area. For 1989-2018 a decrease in the average population in villages 1.3-15.3% in all areas except Lutsk, where it increased by 7.3%.

The largest rural populations of 1,000 or more persons, where at the beginning of 2017. home to 33.4% of the existing rural Volyn located mainly in Kamin-Kashyrskyyi - 15.4% of the total number of villages Lutskyyi - 11.1% Ratnivskyyi - 11.1% and Liubeshivskyyi areas – 10.3%. Villages with populations 500-999 people, which lives mainly peasants 36.4% are located in Horokhivskyyi, Lutskyyi, Manevytskiy regions - 10.3% in the total number of villages and Kamin-Kashyrskyyi district - 8.4%. Small settlements rural areas (SDAs) with populations up to 199 people,

which has 5.9% of the rural population, located mainly in Turiiskyyi - 12.2% of the total number of villages Ratnivskyyi - 9.7%, Kovelskiy and Volodymyr-Volynskyyi areas - by 11.2% [8].

In general, over the period 1989-2006, the share of rural settlements with a population of more than 1,000 people in total their number decreased by 0.9% (Fig. 1). The number of rural populations 500-999 people over the period fell by 1.2%. However, on small villages with populations up to 199 people is worth noting that their share in the total SDA grew by 4.2% [8], which is due, in our opinion, the accelerated decrease in the number of rural residents on average for rural populations and caused by the rearrangement of villages in favour of increasing group of small villages and reduce the group averages for populations of villages. Keeping such dangerous trends in the future will result in a high probability of the rapid disappearance of small villages.

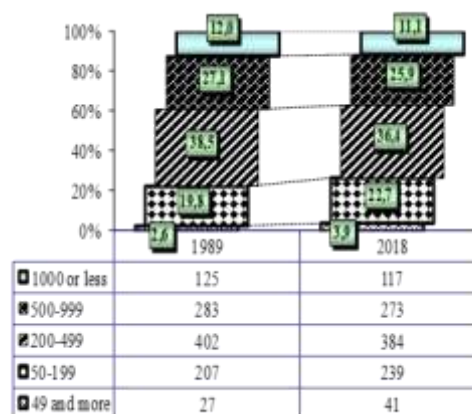


Fig. 1. Distribution villages of Volyn region of Ukraine for populations in 1989 – 2018,%
 Source: own research.

At the beginning of 2018, the average density of existing rural Volyn is 26 people per 1 km², and it is the highest in Lutskyyi – 54 people per 1 km² and Ivanychivskyyi areas – 43 people per 1 km², and the lowest – in Turiiskyyi and Shatskiy – 16 people per 1 km²

Generally describing the settlement system that characterized rural settlement, Volyn region, as the process of distribution of the population in certain places geographical area (distribution of settlements on territory and settlements of people, resulting in the formation of a network of settlements, part of which serve rural areas

[9] clearly distinguishes certain groups of districts.

Therefore, the small settlement system of rural settlement with a high density of rural settlements placement can be attributed: - 2.3 miles at relatively low population. Kamin-

Kashyrskiyi and Liubeshivskiyi districts belong to a large settlement system with a low density of settlements - 3.2-3.7 per 100 km² with an average distance between the rural settlements - 2.9-3.2 km. and their relatively high population (Table 1).

Table 1. Indicators of resettlement and dynamics of the rural population of Volyn region of Ukraine in 1989 – 2018

Areas region	Number of villages in 2018, Ed.	The area* km ²	The average area of 1 village km ²	The average distance between villages, km.	Existing rural population, thousand people		The average population size of the village in 2018, people	The dynamics of the rural population (2018 to 1989), %
					1989	2018		
Volodymyr-Volynskiyi	77	1,038	13.5	2.1	26.5	24.5	318	92.5
Horokhivskiyi	90	1,122	12.5	2.0	44.3	40.6	451	91.6
Ivanychivskiyi	58	645	11.1	1.9	29.4	27.8	479	94.6
Kamin-Kashyrskiyi	64	1,747	27.3	2.9	50.3	50.5	789	100.4
Kivetsivskiyi	72	1,414	19.6	2.5	41.6	40.3	560	96.9
Kovelskyyi	91	1,723	18.9	2.5	36.3	33.2	365	91.5
Lokachynskiyi	53	712	13.4	2.1	22.1	20.3	383	91.9
Lutskiyi	83	973	11.7	1.9	48.6	52.1	628	107.2
Liubeshivskiyi	46	1,450	31.5	3.2	32.0	30.4	661	95.0
Liuboml'skyyi	68	1,481	21.8	2.6	44.3	28.2	415	91.0
Manevytskyyi	69	2,265	32.8	3.2	45.1	42.0	609	93.1
Ratnivskyyi	67	1,437	21.4	2.6	40.3	38.4	573	95.3
Rozhyschenskyyi	66	928	14.1	2.1	29.0	26.5	402	91.4
Starovyzhivskyyi	46	1,121	24.4	2.8	31.2	27.4	596	87.8
Turiiskyyi	74	1,205	16.3	2.3	22.0	18.9	255	85.9
Shatskyyi	30	759	25.3	2.8	-	12.1	403	X
Total	1,054	20,140	19.0	2.5	543.0	513.2	487	94.5

*The area specified excluding areas located in these cities

Source: own research.

It should be noted that the process includes settlement under a historical, economic and socio-cultural background and is in constant dynamic development.

It is worth mentioning separately the Lutskiyi district as a rural urbanized area, which resulted from the interaction of urbanization and ruralization (the process of penetration of rural lifestyle elements in urban settlements). Rural settlements of this territory by administrative-territorial division belong to the rural administrative district, and functionally and spatially are in the area of influence of the regional center and are characterized by a relatively high average population - 628 people and village density - 8.5 per 100 km² Rural habitats can be considered as places of concentration of suburban villages around regional centers and large cities. And links

suburban villages to the city level than within the district settlement system [9]. The population of these villages all social services, in addition to administrative and managerial, gets in, resulting in a significant burden on the municipal agencies of social and cultural direction and purpose.

We offer to explore the relationship between the populations of villages and population dynamics of the existing rural population on the basis of the analytical group, which will partially identify the causes deformations and negative demographic processes change the demographic situation in the country. It should be noted that the number of actual population is determined by summing temporary residents and permanent population of less temporarily absent (from among the resident population of the rural settlement). Having formed a group of

Volyn regions the average population of villages, it should be noted that the areas with the lowest populations (255-433 people). Occupy a continuous area, located in the central-western region (Fig. 2). Areas with average populations 433-611 people crowded area in two units and occupy part of northern, southern and eastern parts of the region. Quantitatively, the smallest group of large settlements is located in the northern and southeastern parts of the oblast and covers Kamin-Kashyrskiy, Liubeshivskiy and Lutskiy districts.



Fig. 2. Cartogram grouping districts of Volyn region of Ukraine the average rural populations in 2018
 Source: Built by the Authors.

Note that in the process of analytical grouping all the elements of the original aggregate sale by factor variable (x), which is the average population size of the village in terms of districts, then each group calculated the average values of resultant variable (y), which is the dynamics of rural population for 1989-2018. As a result, it was found that in the group with the lowest average rural population, the rural population decreased by 9.3% in the study period. In the group with an average population of villages 433- 611 people. - by 6.8%, and in the group with the highest average population of villages (611-789 people), the number of peasants increased by 0.9%.

Thus, there is a clear dependence according to which, in large villages, the number of inhabitants is increasing, in smaller villages, it is gradually decreasing, and in small villages it is declining at an accelerated rate.

However, analytical grouping characterizes only the general lines of communication, which studied its trend, however, does not provide a quantitative assessment of the density of communication. We offer to solve this problem on the basis of the analytical group, using the empirical correlation ratio.

Moreover, we note that in the process of calculating the number of districts in Volyn limited to 15, that is an unaccounted Shatskyi area because it was geographically separated from Liubomlskyi only in 1994. Therefore, changing the number of rural population 1989 – 2018. Liubomlskyi in the area was determined taking into account the number of farmers figures Shatskyi district in 2018. (Table 1 and 2). Such conditional summing the number of farmers these areas can significantly offset the impact of external factors (administrative and territorial separation and formation of a new Shatskyi area in the middle of the study period) the results obtained by calculations.

Thus, the average intragroup variance which determines the variation caused by the influence of all other factors except the grouping is 10.37.

Inter-group variance (δ^2), which measures the variation caused by the influence of factors underlying grouping – the average population of villages is 13.96. By dividing each of the terms of the rules dispersions adding to the total

variance (σ_{tot}^2), The first term $\frac{\sigma_i^2}{\sigma_{tot}^2}$ - shows

what proportion of the total variation is due to the effect of non-grouping features and is 0.43; a

second term $\frac{\delta^2}{\sigma_{tot}^2}$ called the coefficient of

determination - is 0.57. Thus, the survey results revealed that the variation in the dynamics of the rural population in 1989-2018 57% due to a change in the average population of villages 2018, and 43% - the influence of other factors.

Table 2. Grouping of districts of Volyn region of Ukraine by the average population of villages in 2018 and determining its relationship with the dynamics of the existing rural population from 1989 to 2018

Groups regions the average rural populations, persons	The number of districts in the group units.	The dynamics of the existing rural population, %	$(y - \bar{y}_i)^2$	Intra-group variance $\frac{\sum (y - \bar{y}_i)^2}{n}$	$(\bar{y}_i - \bar{y})$	$(\bar{y}_i - \bar{y})^2$	$(\bar{y}_i - \bar{y})^2 \cdot f_i$
And the group (255-433)	6	90.7	3.24; 0.64; 1.44; 0.09; 0.49; 23.04	4.82	-3.04	9.24	55.44
group II (433-611)	6	93.2	2.61; 1.91; 13.57; 0.01; 4.34; 29.34	8.63	-0.52	0.27	1.62
group III (611-789)	3	100.9	0.22; 40.11; 34.42	24.92	7.13	50.79	152.37
Total or average	15	93.7	X	X	X	X	209.43

Source: own research.

The criterion of materiality and the coupling between the factor and efficient characteristics serves correlation ratio (η) is 0.76.

Found that $F_{\text{criterion}(\text{fact})} = 8.08$, $F_{\text{criterion}(\text{tabl})} = 3.89$. $F_{\text{fact}} > F_{0.95}$ [2; 12] is a ninety-five percent probability level that can assert the existence of a significant link between the change in the average population of villages and population dynamics of the rural population.

According to the results of our special studies, the location of the rural settlements (in accordance with the dynamics of the rural population) is significantly influenced by the remoteness of their location from the district center. Thus, it was found that in the villages of Volyn region, located at a distance of up to 3 km. from the district center for 2013 – 2017 the average population increased by 16.8 %; in villages 3 to 5 km away. from the district center – by 11.1 %; and in villages within 5 to 10 km of the district center. – decreased by 2.4% [8]. Thus, as a result of the conducted researches the tendency is established: at the decrease of the average population of villages as a whole on area, in a suburban area it on the contrary -

grows. The pattern is that according to the increasing distance of rural settlements from the district center, the rate of decrease of the average population of villages increases.

In particular, we suggest, using an analytical grouping and correlation analysis based on it, to quantify the density of the relationship between the variation in the proportion of rural settlements located at a distance of 10 km. to the district center and the dynamics of the average population of villages for 1989-2018 by sections of Volyn region (Table 3).

All districts are divided into four groups, with a significant emphasis on the second and third groups (more than 66% of the total). Consequently, in the areas with the lowest proportion of villages located at a distance of 10 km. to the district center the average population in the studied period increased by 0.5 %, and with the highest specific gravity of such villages – decreased by 10.2 %. Thus, according to the obtained dependence, with the growth of the proportion of rural settlements located at a distance of 10 km. to the district center, the dynamics of the average population of villages in the context of districts decreases.

Table 3. Grouping of districts of Volyn region of Ukraine by the proportion of villages located at a distance of 10 km to the district center and to determine its relation with the dynamics of the average population of rural settlements for 1989 – 2018

Groups regions the ratio villages located at a distance of 10 km to the district center, %	The number of districts in the group units.	Dynamics of average population of villages (2018 to 1989), %	Intra-group dispersions, $\frac{\sum (y - \bar{y}_i)^2}{n}$	The average intra-group variance	$(\bar{y}_i - \bar{y})^2 \cdot f_i$	Inter-group variance	The total variance	The coefficient of determination	correlation ratio
Group I- 67.92-74.85	2	100.5	46.44	15.62	116.39	10.16	25.78	0.39	-0.63
Group II - 74.85-81.78	5	91.5	10.44		8.51				
Group III - 81.78-88.71	5	92.9	10.22		0.02				
Group IV - 88.71-95.65	3	89.8	12.71		27.52				
Together	15	92.8	X		152.45				

Source: own research.

According to the results of the correlation analysis, the dynamics of the average population of the villages for the years 1989-2018 39 % due to the variation of specific villages located at a distance of 10 km to the district center, and by 61% - the effect of all other factors.

Moreover, since the value of the resultant sign changes in the opposite direction with respect to the change in the factor, the relation is considered inverse. The empirical correlation is quite high (-0.63), so the correlation between the studied traits is considered significant.

CONCLUSIONS

Obviously, the negative trends in rural development, the threatening demographic outlook in the future, require the development and implementation of effective social policies that can stop destructive processes and provide the necessary conditions to form a rational structure of reproduction.

We agree with the opinion of [5] and some other demographers, who consider demographic policy as an element, component of socio-economic policy as a whole, since it is through socio-economic processes that, through a series of indirect mechanisms, the

different intensity of population development, rates and proportions of its changes.

We believe that scientifically substantiated conceptual directions of demographic development should be directed first of all to overcoming negative tendencies and ensuring rational reproduction of aggregate human potential with its best qualitative and structural characteristics. It is advisable to have an objective combination of self-regulation inherent in socio-demographic processes and purposeful influence on their course. Socio-demographic policy should be aimed at achieving a sufficient level of quality characteristics of the population, which, combined with the use of innovative models of rural development, would provide a significant increase in the living standards of rural residents because one of the main reasons for the current destructive demographic situation is recognized as low living standards. As socio-economic development in the leading countries of the world is based largely on self-renewed autonomous resources, the strategic orientations of the new paradigm of social and demographic development in the Ukrainian village should be based on the formation of a similar resource base, which is possible primarily through the proper reproduction of human capital.

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