INTRODUCTION. DATA. METHODS.

- **Depopulation** is defined as a decrease in an area’s population represented by negative total population change, which may be caused by a negative natural population rate (resulting from more deaths than births), a negative migration rate (when more people leave an area to live elsewhere than enter it), or both these factors at the same time.

- **Objectives:** to identify long depopulating areas in European countries and to compare their populations in terms of age structure.

- **Long-term depopulation:** a real population loss in all years of the period under study.

- **Source:** Eurostat data;

- **Areas of interest and periods of analysis:** European countries (2011-2015, 2016-2020) and NUTS 3 units (2015-2019);

- **Measures and formulas**:

  - Crude rate of natural change (NCR), Crude rate of natural change (NMR), crude rate of total population change (TCR)
  
  \[
  NCR = \frac{\text{NCR}_t}{P_t} \times 1000, \quad \text{NMR} = \frac{\text{NMR}_t}{P_t} \times 1000, \quad \text{TCR} = \frac{\text{TCR}_t}{P_t} \times 1000
  \]

  where \( P_t \) is the population at time \( t \), the natural change \( \text{NCR}_t \), and migration \( \text{NMR}_t \) rates for the whole periods.

- **Methods**:

  - **Webb’s method** (Webb 1963) - was used to determine the causes of depopulation in the areas under consideration. Based on relations between the crude rate of natural change (NCR) and the crude rate of net migration (NMR), eight types of population change (four involving increases and four declines) were identified.

  - **Ward’s method** (Ward 1963) with the Euclidean distance matrix;

    - Ward’s method is agglomerative; thus, it partitions elements into a dedicated number of clusters in several steps. First, each element is independent, and then step by step, more elements will be ordered to a cluster. At each step, the method includes those elements which are the closest (according to a metric) to the existing clusters. The number of steps may reach from 1 to \( n \) (number of analysed elements). In the case of 1, only one single cluster contains all elements, while in the case of \( n \), all elements form their own cluster. Once a cluster is created as a result of a step, the elements of the new cluster cannot be separated again. The algorithm tries to find the optimal number of clustering steps” (Eszergár-Kiss, 2017, p. 26).

CONCLUSIONS

- Depopulation (especially one that persists for a long time and has both natural and migratory causes) entails many demographic, social, and economic problems for the affected areas, such as changes in population age and sex structure, an accelerating pace of population ageing, the dwindling of potential labour resources (the working-age population), and a rising number of old people with disabilities who have no relatives to take care of them and need institutional care.

- The general findings of the study are as follows: eight countries (Bulgaria, Croatia, Greece, Hungary, Latvia, Romania, Serbia and Ukraine) had negative crude rates of total population change in all years between 2011 and 2020. In four of them (Bulgaria, Croatia, Latvia and Romania), the population decrease was driven by natural as well as migratory factors (types F and G; see Tab. 1). In Albania, Lithuania and Portugal, population declines occurred in almost all years between 2011 and 2020, excluding one or two years.

- Regarding the regional level units, 554 out of 1441 NUTS3 had negative crude rates of total population change in all years between 2011 and 2020, excluding one or two years.

- Most long depopulating NTS3 units with the oldest populations in 2019 lay in Portugal, Spain, Greece, Italy and Germany (see Fig. 5).

- The majority of long depopulating countries were similar in the population age structure (see Fig. 6).

- The long depopulating NTS3 units with similar population age structures concentrated in the same country or in adjacent countries (see Fig. 7).

REFERENCES


IN THE SECOND DECADE OF THE 21ST C.

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