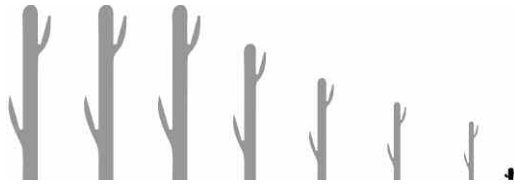


Extended abstract

*Depopulation in Rural Areas in Galicia,
Spain: Population Projections
at the Municipal Level Using
the Joinpoint Method
and Extrapolative Models (2023-2052)*



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Highlights:

1. In 66 % of sparsely populated municipalities, the population followed downward trajectories in 2002-2022.
2. In the rural municipalities analyzed, the demographic decline showed different patterns of speed and intensity.
3. According to our forecasts, 97 % of the municipalities analyzed would continue to lose population between 2023-2052.
4. The forecasts foresee that in 2052 seven municipalities would be depopulated.
5. Only five of the rural municipalities analyzed would increase their population in the period 2023-2052.

Abstract: Rural depopulation is currently considered one of the most urgent problems in European rural areas. However, at the international level, there are few countries where projections have been made at the level of small areas, and at the national level, there are few autonomous communities that make projections below the regional level. Taking Galicia as a study area, where depopulation is a widespread phenomenon that characterises many inland rural regions and some on the Atlantic and Cantabrian coasts, the present paper has a double aim. Firstly, to propose a method for the elaboration of population forecasts in sparsely populated areas using joinpoint regression methods and extrapolative models. Secondly, to analyze the results of its application in the most demographically depressed rural municipalities in Galicia, projecting their population in the period 2023-2052. The results of these demographic forecasts reveal that, if past trends continue, 97 % of the municipalities in the most rural sparsely populated areas will continue to lose population in the period 2023-2052.

Keywords: Galicia, rural depopulation, future scenarios, extrapolative models, joinpoint regression model.

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Extended abstract

1. Introduction and justification

While demographic decline is a phenomenon that can affect both urban and rural areas, in the latter it is more frequent (Newsham and Rowe, 2023). In this context, the year 2020 was highlighted in the scientific literature by observing an increase in internal migratory movements from urban centres to areas with lower population densities in several countries, including Spain (González-Leonardo et al., 2022). In this country, and for the first time in decades, the migratory dynamics that emerged during the COVID-19 pandemic led to an increase in the rural population, mainly in municipalities linked to a functional area. However, in those rural municipalities at risk of depopulation, the population remained unchanged compared to pre-pandemic levels (Gutiérrez et al., 2022). Currently, depopulation is still considered one of the most pressing problems facing Spanish and European rural areas (Gómez and Moyano, 2022; Hernández and Cruz, 2020), but at national and international levels there are very few official agencies that produce and publish projections for small areas (Alonso et al., 2015; Wilson et al., 2022). Our work contributes to the development of prospective demographic studies in small areas, focusing on rural municipalities in Galicia.

2. Objectives, methodology and sources

The aim of this paper is twofold: to propose a method for the preparation of demographic projections at municipal and rural levels, and to analyse these results in the most demographically depressed rural municipalities in Galicia, projecting their population for the 2023-2052 period.

Our methodological proposal begins with a descriptive study of the evolution of the population in each municipality, trying to identify trend changes in the 2002-2022 period by constructing a joinpoint regression model for each municipality (Kim et al., 2000; National Cancer Institute, 2022). From the fit of the joinpoint models, the slopes of the straight lines of the different trends are obtained, which are

subsequently analysed and grouped into clusters. Once the type of trend followed by the municipality has been characterised, we use the linear model and the cohort change method (Díaz, 2022; Wilson et al., 2022) to project the population in the 2023–2052 period, choosing one method or the other depending on the type of trend followed by the municipality in the 2002–2022 period. As the cohort change method projects the population every five years, to obtain the projected values of the population in the intermediate years, we interpolated the data using splines (Forsythe et al., 1977).

To apply the methodology described above to the most demographically depressed rural municipalities in Galicia, we delimited the study area based on the classification of Galician municipalities according to the degree and sub-degree of urbanisation (GU-2016), prepared by the Instituto Galego de Estatística (IGE, 2016). For the elaboration of the demographic projections, we only considered the 180 municipalities grouped in the low ZPP category. In keeping with the type of data used by national statistics departments, to project the population of these municipalities we use the Cifras Poblacionales de Referencia (IGE, 2022b).

3. Results

After identifying the trend followed by each municipality in the 2002–2022 period, we classified the municipalities into five groups. In group 1 (15 municipalities), the population followed a decreasing trend, and the last detected trend was equal to or more decreasing than the previous one. In group 2 (104 municipalities), the population followed a decreasing trend, but in the last detected trend section, the population decreased less than in the previous section, unlike those in group 1. The municipalities of group 3 (38) are characterised by having had at least one population growth section during the study period and one of these sections of positive trends corresponds to the last section. Group 4 (19 municipalities) had some population growth sections over the study period, none of which correspond to that of the last period. Finally, the 4 municipalities in group 5 showed a continuous population growth trend over the study period. To project the population of these municipalities, for groups 1, 2, and 5 we used the linear model and for groups 3 and 4 we used the cohort change method.

The results of the projections reveal that, if past trends continue, more than 97% of the municipalities in the low ZPP would continue to lose population in the

2023-2052 period. The municipalities in group 1 would lose between 28% and 96% of their population in that period. Regarding group 2, for the 24 municipalities that were at risk of depopulation in 2022, the projections estimate population losses of between 36% and 100% over the 2023-2052 period. The counterpoint to these are the 61 municipalities in groups 3, 4, and 5. In the 38 municipalities in group 3, the population projections foresee that only one of these municipalities would continue to grow in the 2023-2052 period. For the municipalities in group 4, the projections show downward trajectories, with population losses of between 13% and 42.4% over the period in question. Finally, the four municipalities in group 5 are expected to increase their population by between 25.7% and 56.3% in the 2023-2052 period.

4. Discussion

The creation of five groups of rural municipalities in the low ZPP according to their population evolution in the 2002-2022 period reveals important issues. Firstly, not all the most demographically depressed municipalities lost population during the analysed period, although the sustained demographic increase has been confined to a small minority (group 5), characterised by their proximity to urban centres and access to high-capacity roads. Secondly, groups 1, 2, and 4 demonstrate the existence of different patterns in the speed and intensity of population decline in this category of rural municipalities. Finally, the demographic growth experienced by the municipalities in group 3 in the last section of the study period opens up new avenues for future research to determine the defining variables in the trend changes observed in this group, including the repercussions of the COVID-19 pandemic.

Compared to other projection methods proposed in the literature, our method presents several advantages as well as downsides. As an advantage, it is worth noting its adaptation to the existence of rural municipalities with very different characteristics, since the projection method is chosen on the basis of the recent population evolution in each of the municipalities. One of the drawbacks, however, is the fact that, since it is based solely on past trends, the projections may be influenced by temporary situations that affect population dynamics, such as the COVID-19 pandemic. But it should also be noted that, as part of the method is applied to population totals, our projection does not provide information on sex and age structure in the future. The usefulness of our projection method will depend on the specific objectives motivating projections in small areas, but in any case, they

represent an important contribution to the field of demographic research at municipal and rural levels, both in Galicia and in national and international contexts.

5. Conclusions

The results of the application of the projection method to the most demographically depressed rural municipalities in Galicia are consistent with the scientific literature, which foresees the continuation of depopulation in practically all of these municipalities in the medium term. In this context, the main contribution of our demographic projections consists in specifying the degree of intensity that the depopulation process could reach in these municipalities by the middle of the century. Perhaps the most outstanding result is the prediction of an unprecedented situation of total depopulation for several municipalities –mainly belonging to mountain areas– in a period of less than 30 years. However, this result must be interpreted taking into account the limitations of the statistical sources used. Therefore, even if the official population figures were to register zero inhabitants in a given municipality, this would not necessarily mean its real demographic *death*.

Apart from the potential transferability of our methodology to other Spanish and/or European rural areas, the projections presented provide basic information at a social level and, especially, at a political level. The ultimate aim of our work is, therefore, to contribute to the awareness of policy makers about the urgency of designing –or redesigning– territorial intervention strategies aimed at the pre-emptive management of the consequences associated with the projected scenarios.

6. Future directions

Due to the impact of the COVID-19 pandemic on rural demographics, a greater temporal distance with respect to the year 2020 will be necessary in order to update the projections and to be able to extract solid interpretations about some of the results obtained. It remains, therefore, for future studies to confirm whether the changes in trends detected in certain municipalities will be maintained in the medium term or, on the contrary, if they are due to temporary circumstances.