

Article

Depopulation and Residential Dynamics in Teruel (Spain): Sustainable Housing in Rural Areas

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Abstract: This article provides a comprehensive analysis of depopulation and residential dynamics in Teruel, a province emblematic of the aging and depopulation issues prevalent in many inland regions of Spain and Europe. Through an in-depth examination utilizing official statistics, academic studies, and reports, this study highlights the demographic structure, historical evolution, and current trends in Teruel. Key patterns of population change and their implications for urban and rural planning are identified. The analysis covers population density, vital balances, and household distribution, with a special focus on the significant role of the foreign population. Additionally, the challenges associated with vacant housing and the management of unused land are discussed, proposing revitalization strategies for the built environment in rural settings through sustainable housing initiatives. This study aims to contribute to the discourse on sustainable development of small cities and rural areas, offering integrated solutions that not only enhance living conditions but also encourage balanced and sustainable growth.



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Keywords: depopulation; residential dynamics; Teruel; demographic analysis; rural planning; population change; sustainable housing; vacant housing; foreign population; sustainable development; inland regions

1. Introduction

The problem of depopulation in rural areas has been extensively discussed by academia, mainly in the field of study about rural sustainability [1]. Rural depopulation, in fact, affects many regions in Europe and has been widely addressed, especially in Spain [2]. There is a current and simplistic perception in the media and public opinion that the origin of rural depopulation is found in the economic decline of a territory and, therefore, that its characteristics are homogeneous in all regions. Consequently, the implementation of common economic measures could reverse that negative situation. However, there is a consensus in the research on demographic changes that population decisions are widely influenced by factors such as the quality of life in a specific place, the harmony between work and family life, and the economic security needed to plan a future without uncertainties that include such decisions. In contrast to urban areas, rural areas exhibit significant deficiencies in the availability of goods and services, particularly those of a collective nature, which are essential to facilitate these life choices [3]. Rural and remote areas lag behind urban areas in terms of territorial assets, including access to services, broadband connectivity, housing prices, and land-use flows [4].

Rural depopulation is a complex, multifactorial, and spatially diverse problem. Hodge et al. [5] already highlighted in 2004 the need for more nuanced analyses to inform rural policies. Studies focused on cases with a wide focus are very relevant because the measures proposed to deal with rural depopulation are closely linked to the nature of the causes and factors identified.

The study on Dağkaramusa village in Western Thrace highlights that political, geographical, economic, and demographic factors, particularly emigration, have led to significant depopulation and residential abandonment, emphasizing the need for integrated revitalization strategies [6]. Some studies address the critical need to combat the depopulation of small rural areas by leveraging the integrated exploitation of local resources [7]: enhancing such local resources and creating supportive environments are crucial for reversing depopulation trends and fostering sustainable rural communities [8]. Pasakarnis et al. [9] identify the gap between aspirations for rural sustainability and the actual implementation of policies, addressing key challenges such as land use management, environmental degradation, and infrastructure enhancement. The authors suggest that a combination of local and EU policies is essential to promote sustainable land-use practices and ensure the long-term viability of rural areas. Meerstra de Haan et al. [10] investigate the perceived failure of citizens' initiatives, identifying key themes such as interactions with governments, appropriation, and personal investment, emphasizing the need for supportive institutional frameworks. A recent deep study on rural development in the Basque Country highlights increased interventionism and directionality, integrating top-down and bottom-up approaches to address depopulation and enhance territorial assets through collaborative governance [11].

The analysis of depopulation must also take into account that it is a complex process, where the loss of population does not always mean the loss of attractiveness of a territory, as shown by the phenomenon known as *counterurbanization*. While the general attraction to rural life plays a role, specific motivations include housing characteristics, environmental qualities, personal reasons, and low house prices [12]. The diversity among migrants ranges from young individuals with low incomes to highly educated, high-income individuals, highlighting varied factors such as proximity to family and friends and the environmental appeal of the area [13]. The transformation of rural spaces through the influx of more affluent populations results in socio-economic and cultural shifts. Solana-Solana [14] emphasizes the challenges and tensions that arise from these changes, focusing on the dynamics between new and long-term residents and the impact on local communities and landscapes. A study on seasonally activated rural areas in Serbia highlights that tourist activity is the primary driver of seasonal population fluctuations, with significant variations observed in mountain and spa regions, peaking during the winter months [15]. Ferrara et al. [16] highlight the need for careful planning and development to balance tourism growth with environmental conservation.

Considering the social impact of rural depopulation, an unavoidable question arises: what urgent measures are needed to reverse the seemingly inexorable dynamics leading to demographic collapse in some European rural territories? The proposed measures that could directly or indirectly act as levers for demographic sustainability can be grouped into four action areas.

The first fundamental pillar for ensuring a sustainable demographic future is, as expected, fostering birth rates and decisively supporting young families. It is evident that without children, generational replacement is impossible. It is crucial to facilitate access to housing, especially homeownership, and to improve the network of childcare facilities and the quality of compulsory education. Public programs enabling the compatibility of parenthood and professional development, such as extended parental leave and flexible work models, are vital. Direct fiscal benefits for childbirth, especially in the province, should be significantly enhanced. Ensuring families' economic security through social policies like a potential rural basic income [17] would undoubtedly incentivize reproductive decisions.

Since pro-natalist measures alone will likely be insufficient to counter the rapid demographic decline, a second major line of action involves designing active immigration attraction policies. The arrival of foreign populations can partially counterbalance the acute endemic demographic imbalances. However, for successful integration and mutual enrichment of the local society, ambitious public reception programs are indispensable, as argued by Castles et al. [18]. Intensive awareness campaigns against discrimination and highlighting the benefits of human diversity in all its forms are also necessary. Additionally, facilitating labor market integration through swift credential recognition and implementing employment quotas for foreign residents in certain sectors would maximize their positive contribution to the province's demography and economy [19].

Another essential strategy is creating attractive opportunities specifically aimed at retaining and attracting young people, both local and foreign. Satisfaction with public services significantly influences younger residents' decisions to remain in rural areas: improving the quality of rural public services can help mitigate depopulation by encouraging younger generations to stay [20]. Expanding educational offerings, particularly vocational training adapted to the changing labor market needs, as suggested by Furlong [21], is key. Enhancing youth employment options, combatting job temporality through tax benefits for companies that sign permanent contracts with those under 30, and providing affordable first-time housing are crucial elements. Strengthening ultra-fast broadband and transport networks would also be critical in any strategy aimed at attracting and retaining young talent. Moreover, flexible public employment formulas allowing young people to balance work with extended stays in their hometowns would positively impact population retention post education.

Fourthly, there are a group of measures related with seniors. Strengthening public health systems, long-term care, and social assistance in response to the existing and likely worsening massive aging [22] is crucial. Programs promoting healthy habits and preventive healthcare [23] aim to extend life expectancy while maintaining full physical and mental faculties. In a complementary way, exploring innovative economic alternatives around the so-called "silver economy," such as health tourism or social wellness for affluent retirees [24], seeks to find market niches leveraging the demographic profile rather than suffering its consequences, which, in turn, create employment opportunities to provide health and hospitality services. Additionally, incentivizing active social participation of the elderly through associations, intergenerational activities, senior volunteering, and lifelong learning harnesses their vast experience as a cultural development engine and intangible heritage transmission.

In short, the literature reviewed concurs on the necessity of a holistic approach involving simultaneous actions across multiple areas in a coordinated and sustained manner over years. There are no magical solutions; only by concurrently changing numerous socio-demographic, cultural, and economic factors can the current trajectory be progressively corrected.

Nevertheless, the implementation of the majority of initiatives should take into account that the success is conditioned by the availability of accommodations and housing in rural areas. For example, the report *Analyzing Rural Areas in a Positive Way* [25] indicates that the main housing problem for rural youth in Spain is cost: more than 65% of respondents identify it as an obstacle to staying or settling in a rural area. Additionally, the difficulties of obtaining mortgage loans and meeting initial payments (deposits, down payments, etc.) are highlighted as very significant barriers. Financial challenges are followed in the mentioned report by problems related to the quality and availability of housing (both cited by more than 20% of respondents), as well as the lack of public services. This pattern holds for both those who are independent young people and those who are not. Alternatively, the study on the resale of "right to buy" dwellings in rural England shows that the affordability of these homes in a competitive market enables young, dual-career urban families to move to the countryside, significantly impacting local housing provision and illustrating a notable shift in resident demographics [26]. Therefore, public housing policies and residential

environment management services are particularly influential, with their impact being stronger in regions with lower economic potential.

The relationship between the population and a territory is established through housing: an enclosed and covered space built to provide shelter, habitation, and security for people. Beyond this primary function, the grouping of homes is indispensable for the creation and maintenance of family and community ties, the existence of municipalities, and the retention of population in a territory. Housing has a triple legal dimension: it is real estate that can be sold or rented; the assembly of homes in fixed and stable spaces over time forms municipalities, where inhabitants autonomously manage common interests through town councils; and, finally, a citizen acquires civil residency in the municipality where the home in which they permanently reside is located. The availability of adequate and affordable housing is crucial for the social cohesion of a community, as it creates the conditions for the development of family and community life. Additionally, housing and urban planning projects that involve the community in their design and implementation strengthen community bonds and foster a sense of belonging and pride among residents.

Housing dynamics in depopulated rural areas differ significantly from those in urban settings, each presenting unique challenges and opportunities shaped by demographic trends, economic conditions, and socio-political factors. Understanding these differences is crucial for developing effective housing policies and interventions. Rural regions often struggle with maintaining and attracting residents, impacting the housing market and community sustainability. In contrast, urban areas often experience rapid population growth and must manage the arrival of new inhabitants.

One of the most pressing challenges in cities is housing affordability: high demand for housing drives up property prices and rents, high construction costs, stringent land-use regulations, and limited availability of buildable land, making it difficult for low- and middle-income families to find affordable housing [27]. In some urban areas with limited space for expansion, high population density often leads to overcrowded living conditions, straining infrastructure, reducing quality of life, and increasing public health issues. Housing could even be perceived as a social determinant of health [28]. Additionally, the gentrification of traditionally lower-income neighborhoods can bring economic revitalization but also displace long-term residents, creating new accommodation problems and contributing to the socio-economic divide within urban communities [29]. Urbanization drives up housing demand, leading to higher costs and competitive real estate markets [30]. This scenario is evident in cities where housing prices outpace income growth, causing affordability crises and increasing homelessness rates [31].

In contrast, rural areas face opposite housing challenges: continuous demographic decline results in a surplus of vacant, deteriorated, and depreciated houses, often characterized by a lack of modern amenities and poor housing conditions. These regions often experience a vicious cycle: unoccupied houses become a visible sign of decline, making these areas less attractive to both potential in-migrants and the remaining population, who frequently lack the resources to renovate or maintain the properties [32]. Consequently, property values and rents remain low and accelerate the decline, in stark contrast to urban areas where prices increase despite infrastructure problems. Additionally, the decline and aging of rural populations reduce economic progress and, therefore, the investment capacity of municipalities in the infrastructure. Rural areas often have limited access to essential services such as healthcare, education, transportation, and broadband, further reducing the attractiveness of these areas to potential new occupants [33]. According to the push-pull theory [34], migration decisions are influenced by push factors (negative conditions in the origin) and pull factors (attractive conditions in the destination), along with intervening obstacles and personal factors. The migration decisions are complex, often non-rational, and driven by individual perceptions that may outweigh actual conditions and are not always voluntary. However, there is evidence that housing has a pivotal role in the economic development of rural areas, and, therefore, it is a crucial factor for attracting and retaining residents and businesses [35].

Regarding opportunities, urban areas demand the implementation of innovative housing solutions to address affordability and space constraints. Options include micro-apartments [36], co-living spaces [37], and repurposing commercial properties for residential use. Cities also need to apply sustainable development practices to create more resilient and eco-friendly housing, thereby improving living conditions in overcrowded areas [38]. Collaboration between the public and private sectors can enhance housing development and affordability through building partnerships, supporting community-based housing initiatives, implementing rent control measures, and providing housing vouchers [39,40].

In comparison, rural areas have opportunities to implement housing rehabilitation programs to improve the quality of existing homes and capitalize on niche markets that attract residents interested in sustainable and community-focused lifestyles, such as agritourism and eco-tourism [41]. There is a trend of repurposing traditional rural dwellings to counteract depopulation and promote sustainable development [42]. Public-private cooperation can support small businesses and local entrepreneurship, invigorating the local economy and creating demand for housing. This can be complemented with tax incentives, grants, and subsidies for home renovations.

In conclusion, both urban and depopulated rural areas face unique housing challenges that require tailored solutions to the specific needs of these areas. Urban areas grapple with issues stemming from rapid population growth, high housing costs, and infrastructural tension. In contrast, depopulated rural areas struggle with declining populations, economic stagnation, and inadequate services. However, each setting presents distinct opportunities for intervention. In rural settings, initiatives such as the rehabilitation of existing properties, improvement of housing quality, niche market development, and supportive policies to revitalize communities and attract residents are crucial. Conversely, urban housing policies often focus on increasing housing supply through new construction, implementing rent control measures, developing innovative and sustainable housing solutions, and providing financial assistance for affordable housing projects. At a time when the suburban model is under scrutiny by politicians, vacant housing lies at the core of the demographic, economic, and political challenges facing rural areas [43]. Addressing these challenges with targeted, context-specific strategies is essential for promoting sustainable housing and enhancing the quality of life in both urban and rural environments.

According to the aforementioned discussion, it is evident that there is a recognized consensus within the academic literature that housing issues are intricately linked to the demographic characteristics of a given territory. Recent literature has explored how demographic shifts, such as aging populations, urbanization, and migration patterns, directly impact housing demand and supply. The availability of housing in a territory is conditioned by demographic factors such as the natural population balance and migratory movements linked to economic activities that attract or expel inhabitants over time. In turn, the availability and characteristics of buildings intended for human residences influence the demography, socio-economic structure, and future of a municipality and a region. Housing is present as one of the main elements of analysis and indicators in studies on rural sustainability [1]. Mulder emphasized the need to integrate housing policies with demographic trends to foster sustainable and resilient communities [44].

Within this theoretical framework, the main objective of this study is to explore the relation between demographic and housing in depopulated rural areas, taking the Spanish province of Teruel as a case study.

Since 1960, rural areas in the European Union have undergone significant population decline [45], with 44% of the EU's territory now classified as rural [46]. According to the Spanish Ministry of Agriculture, Fisheries, and Food, 15.9% of the Spanish population is registered in rural municipalities (with fewer than 30,000 inhabitants and a population density of fewer than 100 inhabitants per km²), which span 84% of Spain's territory, with an average density of 17.8 inhabitants per km², and which experienced a 7.1% population decline between 2011 and 2020, despite an overall demographic growth of 0.6% in the country [47]. Teruel, with a density of 9.1 inhabitants per km², has lost about half of the

population in the last century, so it is emblematic of the aging and depopulation issues prevalent in many inland regions of Spain and Europe.

To achieve the objective, three research questions will be elucidated:

- RQ 1: What are the characteristics of population decline of Teruel?
- RQ 2: What are the residential landscape and dynamics in Teruel?
- RQ 3: What proposals have been revealed to repopulate the province of Teruel?

Based on the analysis of the results obtained, the following hypothesis is intended to be validated:

H1. *Depopulation does not favor the settlement of new residents in a municipality because it negatively impacts the quality of housing supply.*

H2. *The public policies prioritize acting on housing to reverse depopulation as a prior step to other general measures.*

The findings will contribute to the debate on how to help the demographic sustainability of inland European rural territories.

2. Materials and Methods

This study employs a qualitative research approach of an exploratory nature to analyze depopulation and residential dynamics in Teruel. The methodology integrates the collection and analysis of statistical information and the examination of academic studies and reports.

Statistical information from official sources is collected and analyzed to identify the demographic structure, historical evolution, and current trends in Teruel. Primary sources utilized in this study include the Instituto Nacional de Estadística (INE, National Statistics Institute), which publishes extensive demographic data and indicators essential for understanding population changes over time in Spain. The INE's Basic Demographic Indicators provides foundational demographic information, while other publications offer insights into broader social and economic trends impacting population dynamics. The Instituto Aragonés de Estadística (IAEST, Aragonese Institute of Statistics) is another critical source, supplying detailed statistical data on population and housing within the region. The IAEST publishes comprehensive reports in Excel and PDF formats, including monthly bulletins and annual summaries that cover various demographic and residential aspects. These reports provide valuable data on population density, household distribution, and the degree of housing occupancy, which are crucial for understanding residential patterns in Teruel. The study also utilizes data from the Ministry of Transport, Mobility, and Urban Agenda, which offers insights into urban areas and their interactions with rural regions. This contextual information is vital for framing the dynamics of rural depopulation within the broader trends of urbanization and regional development.

Concerning housing, there are two main sources of information. Firstly, the General Directorate of the Cadastre, under the Ministry of Finance and Public Administration, is responsible for maintaining a continuously updated register of urban real estate and its various uses, along with its cadastral value according to the latest year of revision: the Urban Real Estate Cadastre Statistics. Otherwise, INE conducts a Population and Housing Census, which continues an uninterrupted statistical series initiated in 1857, with decennial updates based on household interviews by census agents. However, the 2011 census was compiled by essentially combining the Municipal Register with a georeferenced building census and a large sample survey on people and housing [48]. In 2021, the INE adopted a major methodological change for conducting the census: the cross-referencing and analysis of data from various electronic administrative records, allowing for the availability of annual population censuses and housing censuses, presumably every three to four years.

In addition to statistical data, the study reviews relevant academic literature and reports to contextualize and enrich the findings. This includes examining demographic studies to understand population decline and its implications for rural areas, as well

as analyzing reports on housing dynamics to identify trends and challenges related to residential mobility and vacant housing.

The final phase of the methodology involves synthesizing the collected data and performing a comprehensive analysis. This analysis focuses on identifying key patterns of population change and their implications for urban and rural planning. It also assesses the distribution and condition of housing, including the prevalence of vacant homes, and evaluates the role of the foreign population in shaping residential dynamics. Furthermore, the study proposes integrated solutions for sustainable housing that aim to enhance living conditions and promote balanced, sustainable growth in rural areas.

3. Results

The province of Teruel (Autonomous Community of Aragon, Spain, Figure 1) consists predominantly of rural municipalities, with the exception of the capital, Teruel, and has experienced a notable demographic decline, with multiple indicators evidencing an unprecedented population decline that severely jeopardizes future sustainability.



Figure 1. Province of Teruel. Source: Wikipedia URL [https://es.wikipedia.org/wiki/Provincia_de_Teruel#/media/Archivo:Teruel_in_Spain_\(plus_Canarias\).svg](https://es.wikipedia.org/wiki/Provincia_de_Teruel#/media/Archivo:Teruel_in_Spain_(plus_Canarias).svg) (accessed on 2 August 2024). Spain with Teruel in red colour.

As shown in Figure 2, Teruel reached its peak population in 1919 with 255,491 inhabitants. According to the latest census data, in 2021, the province's population was 134,259 inhabitants, just over half of what it was a century ago. Of this total, 15,604 are foreigners, bringing the native population to below 120,000 residents.

Since the 1980s, the primary cause of depopulation has been negative natural growth due to aging and a low fertility rate. In what has come to be known as the “vicious circle of depopulation” [49], the decline in the rural population leads to a series of interconnected challenges that perpetuate and exacerbate the problem. Moreover, the depopulation phenomenon in Teruel has been influenced by historical and structural factors, such as the disintegration of local economies based on self-sufficiency and the penetration of the market economy, as well as the lack of investment in infrastructure and innovation capacity [50].

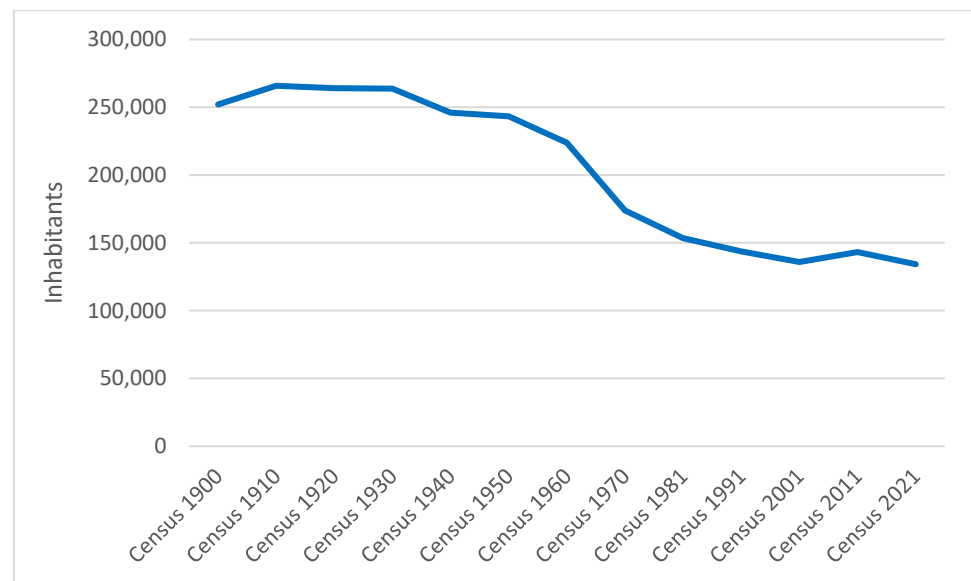


Figure 2. Evolution of inhabitants of Teruel. Source: 2021 Census. INE.

Currently, only two cities have more than 10,000 registered inhabitants: Alcañiz (16,064) and the capital, Teruel (35,900), which have 38.65% of the province's population. Below this threshold, sixteen municipalities have between 1000 and 10,000 inhabitants, and up to 94 villages have fewer than 100 registered inhabitants. The very low population density further reflects the severe demographic problem, as more than 8000 km² of the province, 56% of its area, have fewer than two inhabitants per km². In summary, the updated data certify the very severe demographic situation in the province of Teruel, where only a minority of localities maintain their population, while most of the territory is practically uninhabited and faces a bleak demographic future.

3.1. Demography: Population Decline of Teruel

The province of Teruel and its regions face an extremely concerning demographic situation, with multiple indicators evidencing an unprecedented population decline that severely compromises future sustainability. Teruel has experienced significant and gradual population loss, declining to almost half its previous number, linked to emigration, low birth rates, and increased mortality, especially during the economic crisis and the COVID-19 pandemic. The explosive combination of very low birth and fertility rates, skyrocketing mortality rates due to massive aging, extremely high dependency ratios, sustained negative migration balances, and a relentless exodus of young people seeking opportunities outside the region has resulted in a starkly depopulated province. These factors have compounded over time, creating significant demographic challenges for the region.

There are two items that show the difference between Teruel and Spain: 9.1 inhabitants per km² compared to the national average of 93.7 (see Figure 3), and 138 elderly for every 100 young people, compared to the national ratio of 104 elderly per 100 young people. Furthermore, the differences are increasing, as shown in Figure 1. This contrast highlights a severe depopulation process compared to the national trend of demographic concentration in urban areas.

At the regional level, areas like Maestrazgo, Gúdar-Javalambre, and Sierra de Albaracín (see Figure 4) have population densities below five inhabitants per km², indicating a highly unequal population distribution concentrated mainly in regional capitals (see Table 1). This suggests demographic and socio-economic polarization within the province, with certain areas experiencing notable challenges in terms of employment scarcity and limited-service accessibility, perpetuating low population densities and the depopulation issue. The demographic structure is deeply marked by its rural character, with most

municipalities having fewer than 500 inhabitants, reflecting a highly fragmented population distribution.

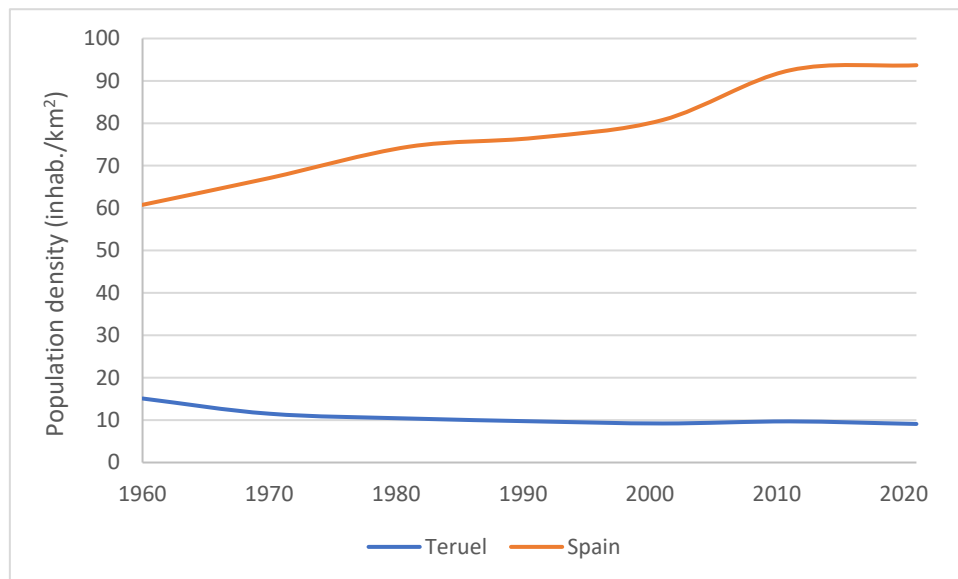


Figure 3. Evolution of Population Density. Spain and Teruel (inhabitants/km²). Source: 2021 Census. INE.

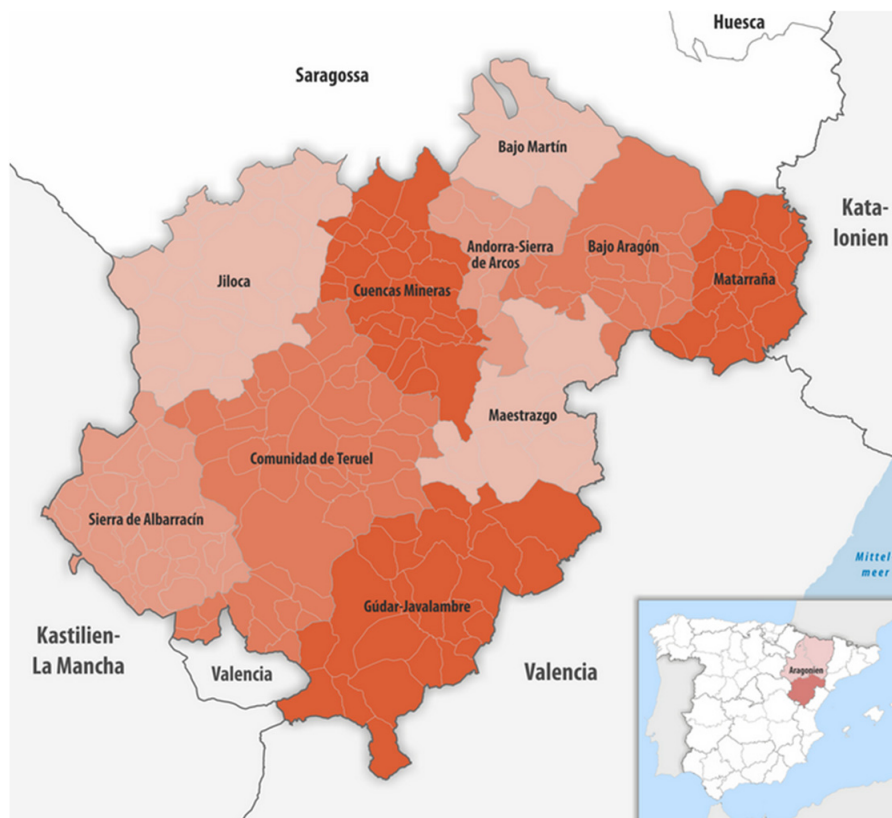
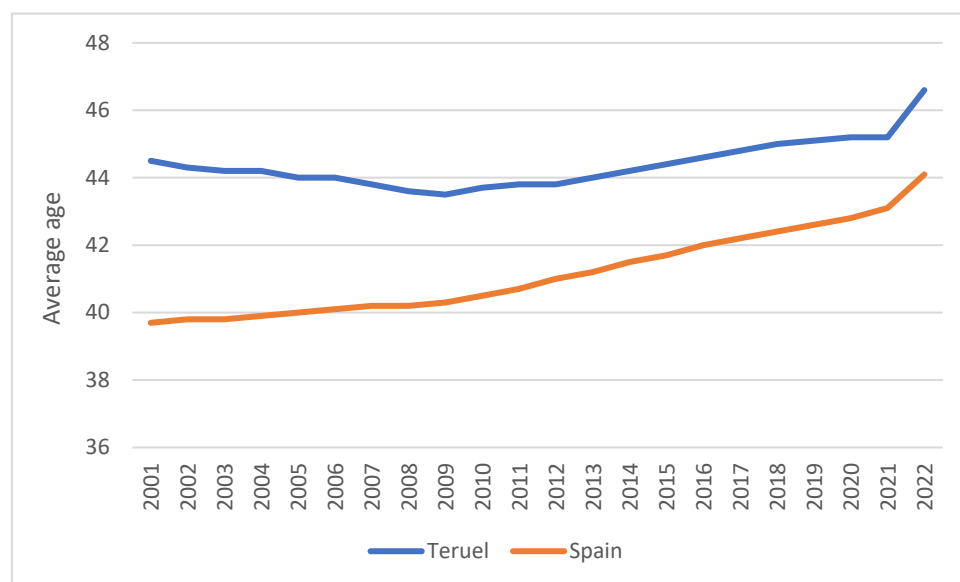


Figure 4. Districts (group of municipalities) of the province of Teruel. Source: Wikipedia https://de.wikipedia.org/wiki/Datei:Provinz_Teruel_2022.png (accessed on 22 July 2024).

Table 1. Population density of the districts of Teruel, 2022. Source: IAEST.

	Area (km ²)	Population	Density
Comunidad de Teruel	2791.93	46,157	16.53
Gúdar-Javalambre	2351.58	7678	3.27
Jiloca	1932.34	12,390	6.41
Sierra de Albarracín	1414.12	4425	3.13
Cuencas Mineras	1407.85	7800	5.54
Maestrazgo	1204.25	3141	2.61
Matarraña	933.07	8306	8.90
Bajo Martín	795.19	6270	7.88
Andorra-Sierra de Arcos	675.05	9547	14.14

As shown in Figure 5, the province of Teruel has consistently maintained a higher average age than the national average. Future projections are equally grim: the INE forecasts that by 2037, those over 65 will account for more than 30% of Teruel's population, dangerously increasing the ratio of dependency on the active population. These are just some of the demographic imbalances highlighting the magnitude of a true demographic emergency threatening the very survival of the territory.

**Figure 5.** Average age. Spain and Teruel. Source: INE.

Teruel's population pyramid (Figure 6) shows an aging population, with a balanced distribution between men and women at younger ages but an increasing proportion of women as age increases, particularly from age 65, aligning with higher female life expectancy.

The data for the province of Teruel (68,207 men and 66,214 women) yield a sex ratio of 1.03, indicating a higher proportion of men than women, contrasting with the Spanish national average, where there are fewer men than women. The sex ratio, which reflects the proportion between men and women in a population, reveals interesting differences at the national, regional, and provincial levels in Spain. Nationally, the sex ratio is 0.961, indicating that there are fewer men than women. In the autonomous community of Aragón, this ratio is closer to equilibrium with a value of 0.977, showing a slightly smaller difference between the number of men and women compared to the national average. However, in the province of Teruel, the situation is reversed with the aforementioned sex ratio of 1.03, meaning that there is a higher male presence relative to females. The lack of a female population and the advanced aging of the population, which results in many passing the reproductive age, represent a significant weakness in the demographic structure of the region, particularly in predominantly rural municipalities. Additionally, the rural

environment generally suffers from insufficient economic dynamism to attract external populations that could compensate for the natural trend of a population with limited capacity to ensure the necessary generational renewal.

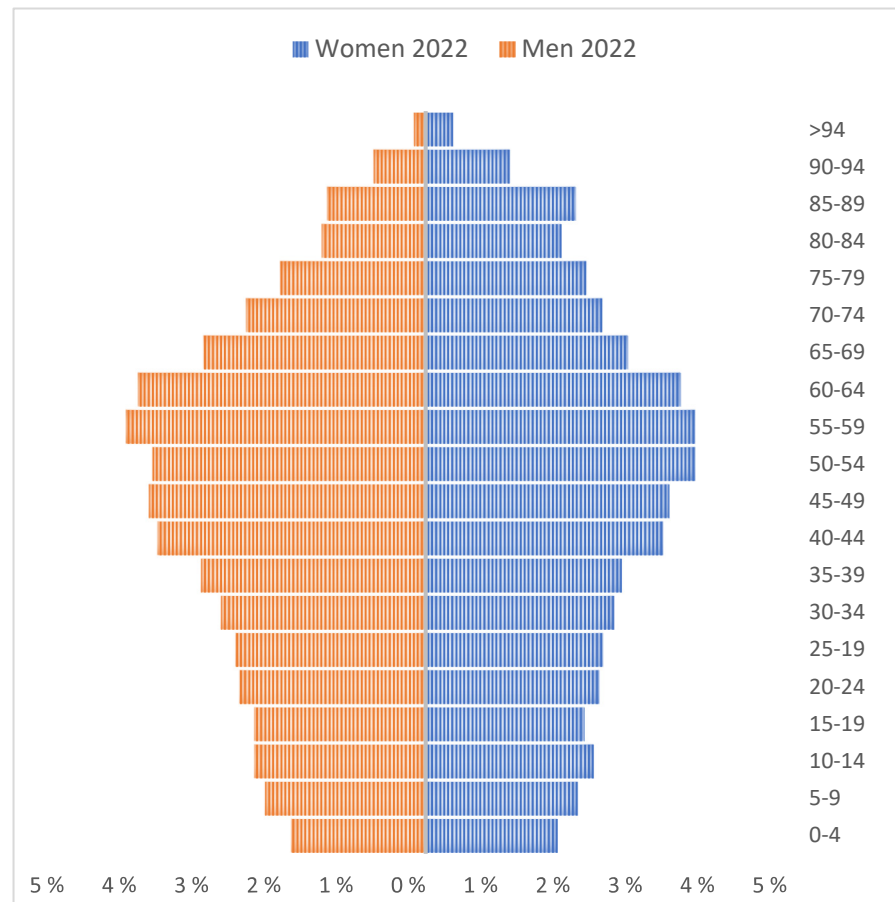


Figure 6. Total registered population by five-year age groups and sex. Source: Municipal Register of Inhabitants as of 1 January 2022. INE.

Having a sex ratio greater than one has various implications affecting the structure and sustainability of the population in this territory. A primary challenge is the difficulty for men to find partners within the province itself, which may encourage male emigration in search of areas with a more balanced gender ratio. Additionally, with fewer women of childbearing age, there are significant declines in birth rates, leading to a progressive aging of the population pyramid. This, in turn, endangers the survival of small municipalities that see fewer children and young people to ensure the necessary generational renewal. Economic problems also arise in labor sectors that traditionally require more female workforce, such as care for the elderly or dependent individuals.

In some cases, there could be a return of women who emigrated to other parts of Spain, attracted by the difficulties that Turolense men face in forming stable families. However, this return is usually insufficient to compensate for the underlying trends that perpetuate the gender demographic imbalance. In short, the high sex ratio in Teruel only exacerbates the severe demographic crisis of the area and introduces additional difficulties for population settlement, especially for young and female populations. Therefore, active policies are needed to help reverse this complex situation.

The described situation is paradoxical when we analyze the sex ratio at birth in parallel (Table 2), which is defined as the total number of male births per 100 female births recorded among mothers from a specific area during the study year.

Table 2. Sex ratio at birth Spain, Aragon and Teruel, 2022. Source: IAEST.

	Spain	Aragon	Teruel
Sex ratio at birth	106.21	105.9	95.5

We face an apparent contradiction between a general sex ratio above one (more men than women in the population of Teruel) and a sex ratio at birth below 100 (more girls born than boys). Perhaps the explanation lies in other demographic factors such as differential mortality by sex or migratory flows. That is, although more girls are born, over time and due to the effects of these other indicators, there end up being more men. As shown in Figure 7, the difference between Teruel and Spain is maintained over time.

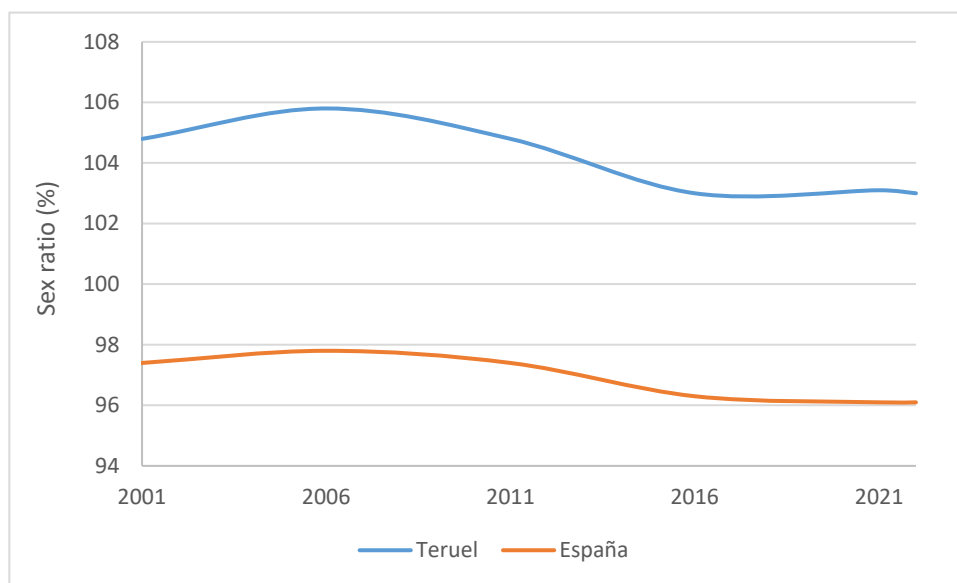


Figure 7. Sex ratio. Comparative temporal evolution in Spain and Teruel. Source: Municipal Register of Inhabitants as of 1 January 2022. INE.

Otherwise, as shown in Table 3 and Figure 8, the province has one of the highest general fertility rates in Spain, with values significantly higher than the average, indicating greater reproductive potential than other areas and potentially valuable for fostering generational renewal in an aging province.

Table 3. Spanish provinces with the highest global fertility rate. Source: INE, 2022.

	Province	Global Fertility Rate
1	Almería	40.53
2	Murcia	38.34
3	Teruel	37.20
4	Lleida	34.96
5	Granada	34.34
6	Córdoba	33.84
7	Huesca	33.68
8	Girona	33.65
9	Navarra	33.30
10	Araba/Álava	33.15

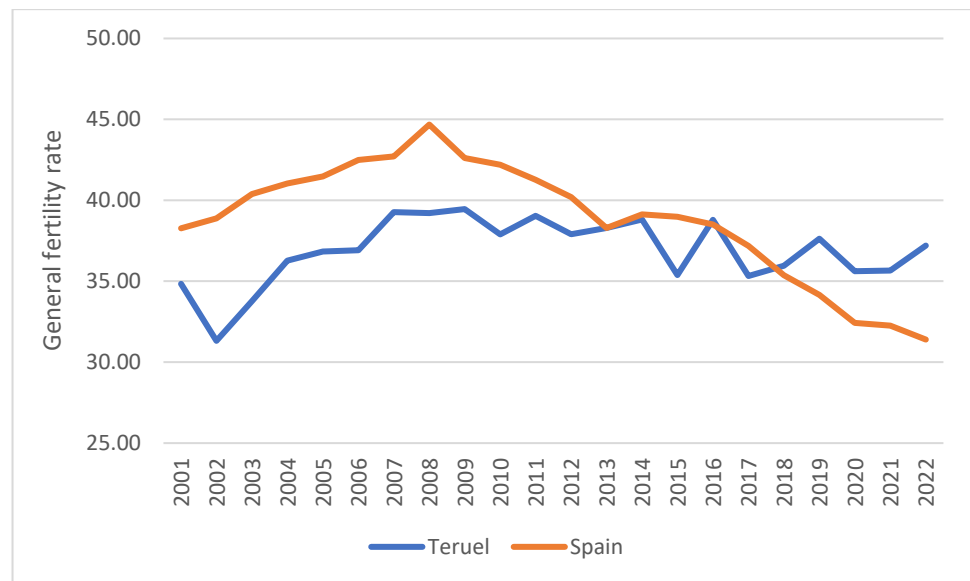


Figure 8. Evolution of the general fertility rate. Spain and Teruel, 2001–2022. Source: INE.

However, despite the favorable general fertility rate, Teruel faces severe population aging and a lack of women of childbearing age, representing a significant challenge for maintaining its demographic structure and long-term sustainability, especially in predominantly rural municipalities.

Teruel has the highest crude mortality rate in Aragón, significantly exceeding the national average, reflecting a particularly aged demographic profile. With 13.95 deaths per thousand residents, this figure indicates much higher mortality than in other parts of Spain, highlighting the issue of advanced aging and its consequences for the province. Teruel’s historical mortality rate trend shows a gradual increase, contrasting with a more stable national trend. Since 2001, mortality in Teruel has consistently been higher than the Spanish average, as Figure 9 shows.

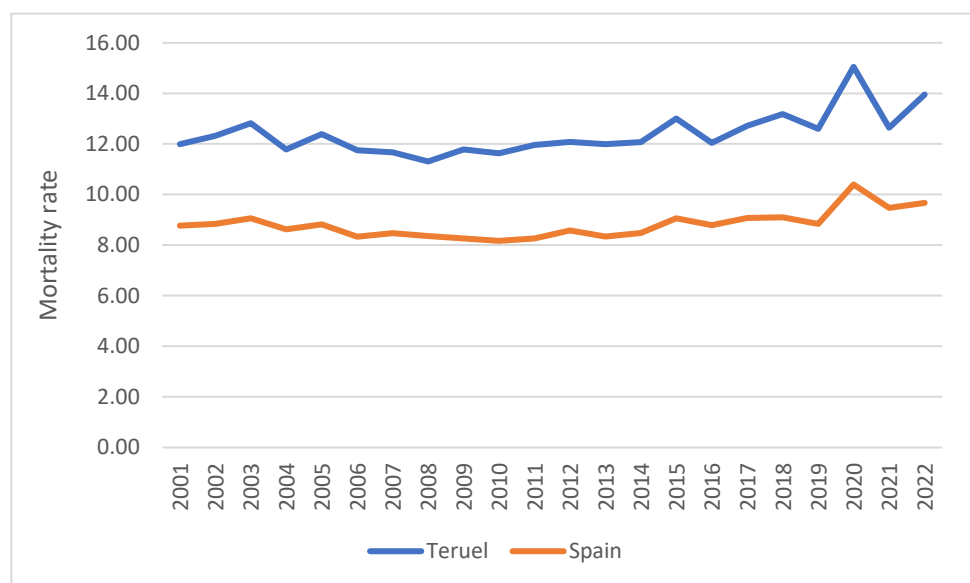


Figure 9. Evolution of the mortality rate. Spain and Teruel, 2001–2022. Source: INE.

Teruel has a deeply negative natural balance, with -5.86 in 2021, indicating nearly six more deaths than births per thousand inhabitants. This is the most negative balance among Aragón’s provinces and significantly exceeds the national average of -2.37 , reflecting a

notable imbalance between birth and death rates in the province. Teruel’s natural balance has been consistently negative since 2001, with more deaths than births, unlike Spain, where the balance only turned negative beginning in 2015. This pattern, shown in Figure 10, underscores Teruel’s severe aging and inability to replace its population, endangering long-term population regeneration and sustainability.

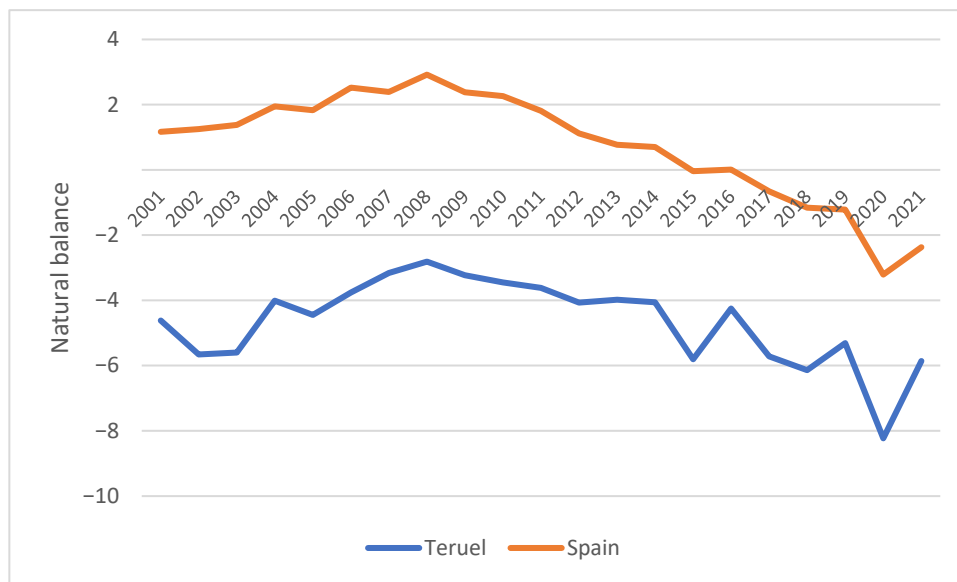


Figure 10. Natural increase in population, Spain and Teruel, 2001–2021. Source: INE.

Teruel’s dependency ratio is significantly higher than the national and Aragón averages, at 61.08% in 2022 (see Table 4). This indicates a higher proportion of potentially inactive population (under 16 or over 64 years) relative to the potentially active population (16–64 years).

Table 4. Dependency ratio. Spain, Aragón, and Teruel. 2022. Source: INE.

	Spain	Aragon	Teruel
Dependency Ratio	54.16	58.59	61.08

This high dependency ratio reflects the province’s aging population and poses an economic challenge, suggesting a greater burden in terms of care and support required by an aging population, as well as potential pressure on the active population. Teruel consistently shows a higher dependency ratio than the national average of Spain. In 2001, Teruel had a dependency ratio of 68.64, significantly higher than Spain’s 48.26. From 2001 to approximately 2008, the dependency ratio in Teruel showed a decreasing trend, dropping to 59.44, while in Spain, the ratio remained relatively stable with slight fluctuations around 47. This could indicate an improvement in Teruel’s demographic structure during those years, possibly due to an influx of working-age population or an improved birth rate. However, from 2008 to 2022, the trend in Teruel reversed, and the dependency ratio began to gradually increase, reaching a value of 61.08 in 2022. Meanwhile, Spain also experienced an increase in the dependency ratio during this period, rising from 47.17 in 2008 to 54.16 in 2022, reflecting the general aging of the population at the national level. It is notable that throughout the observed period, the gap between Teruel’s dependency ratio and the Spanish average decreased (see Figure 11).

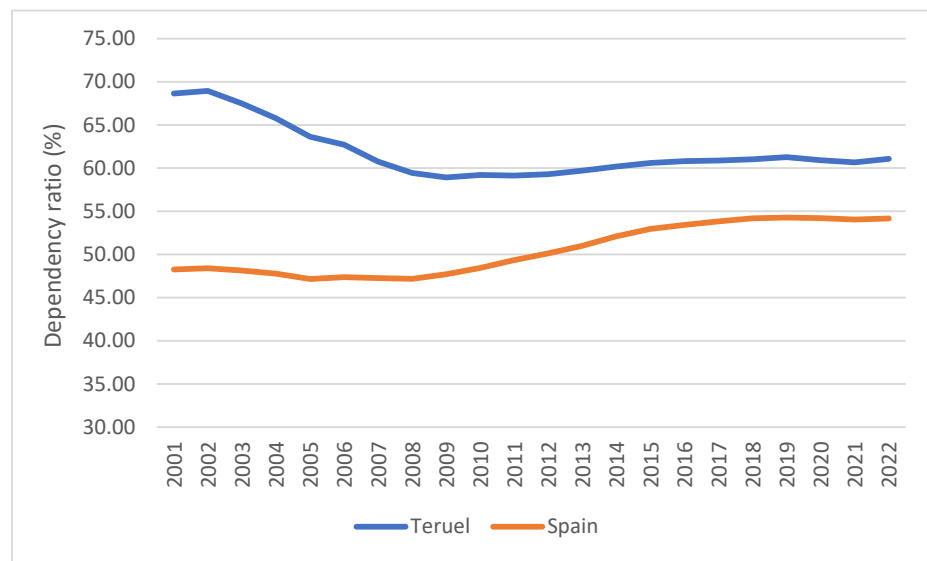


Figure 11. Dependency ratio. Spain and Teruel, 2001–2022. Source: INE.

The proportion of foreign population (foreign-born population, according to INE) in Teruel is similar to the national average, at 11.56% in 2022 (see Table 5), indicating immigrant integration comparable to the rest of Spain. This figure, though slightly below the Aragón average, shows that Teruel has followed a parallel national trajectory in terms of immigration, with rapid growth in the central years of the studied period and stabilization in the last decade.

Table 5. Proportion of Foreign Population. Spain, Aragón, and Teruel. 2022. Source: INE.

	Spain	Aragón	Teruel
Foreign population (%)	11.4	11.81	11.56

Teruel’s migration balance in 2021 is positive, with 3.21 more immigrants than emigrants per thousand inhabitants, reflecting a similar migration performance to Spain overall (see Figure 12). This suggests that despite demographic and economic challenges, Teruel has managed to attract and retain foreign population, partially counteracting the effects of depopulation and aging.

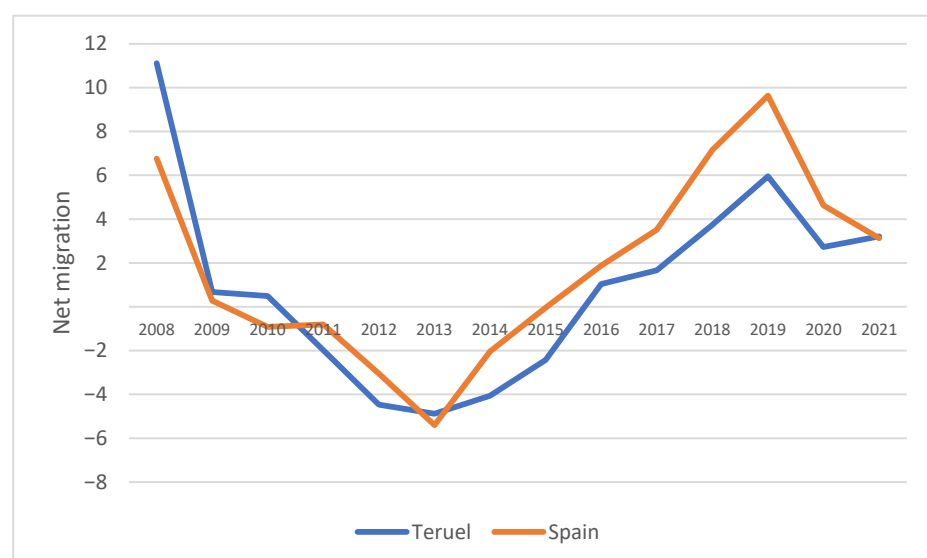


Figure 12. Net migration. Spain and Teruel, 2008 (first available data)–2021 Source: INE.

Teruel has experienced significant variations in its active population in recent years, including a notable increase in 2023, reflecting a recovery in the number of employed people, suggesting improvement in the post-pandemic labor market. The province has a low proportion of the young and working-age population compared to the national average and neighboring provinces in Aragon. A decrease in the proportion of the employed population in the agricultural sector and constant growth in the services sector reflect a shift in the province's economic structure, aligning with contemporary economic trends favoring tertiary activities (see Figure 13). This sectoral shift can have significant implications for labor training, economic planning, and regional development in Teruel.

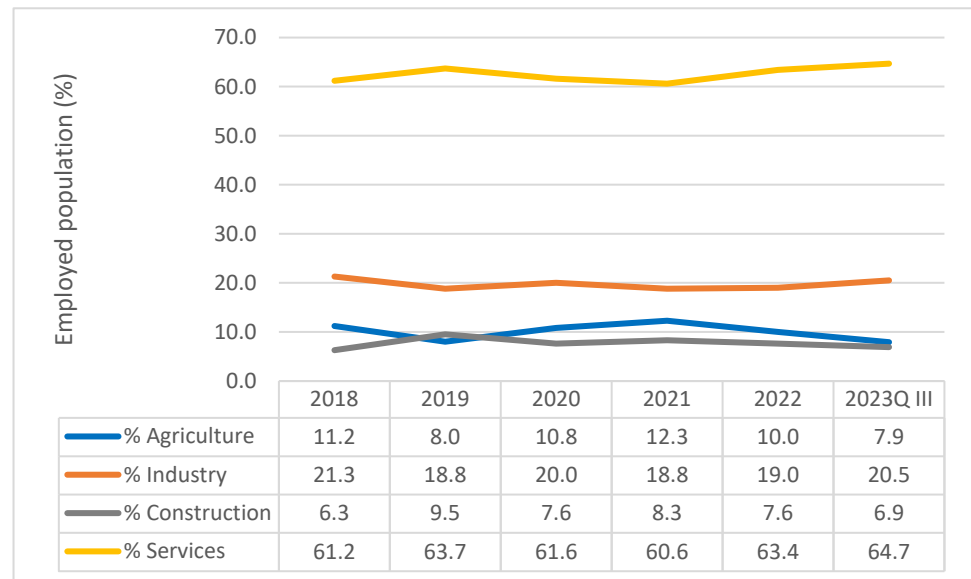


Figure 13. Temporal evolution of the percentage distribution of the employed population by economic sector. Teruel 2018–2023 (Q3). Source: EPA_INE.

Demographic projections indicate that Teruel will continue to experience population aging. The proportion of the population over 65 is expected to increase significantly, exceeding 30% of the total by 2037. This aging is reflected in the projected increase in the median age to 48.15 years by 2037. Consequently, the dependency ratio is expected to rise considerably, from 61.82% in 2023 to 74.89% in 2037, indicating a growing proportion of elderly people compared to the younger and working-age population. This demographic change will have significant implications for the local economy, labor market, and social services, such as healthcare and support for the elderly.

Despite population aging and the relative decline in the working-age population, a slight increase in Teruel's total population is projected until 2037. This growth is mainly attributed to immigration, as the number of foreign residents in the province is expected to increase significantly, partially offsetting the decline in the national population. This increase in the foreign population may offer opportunities to revitalize certain economic sectors and mitigate some challenges of population aging, although it also poses challenges in terms of social integration and service planning. These figures are reflected in the evolution of the population pyramid by the year 2037, as Figure 14 shows.

In conclusion, the province of Teruel faces a significant demographic crisis, characterized by significant population decline due to low birth rates, high mortality, and negative migration balances. These trends have led to an aging population and a high dependency ratio, with projections indicating further deterioration by 2037. The data reveal stark contrasts between Teruel and the national averages, underscoring the urgent need for targeted policies to address these demographic challenges and ensure the region's future sustainability.

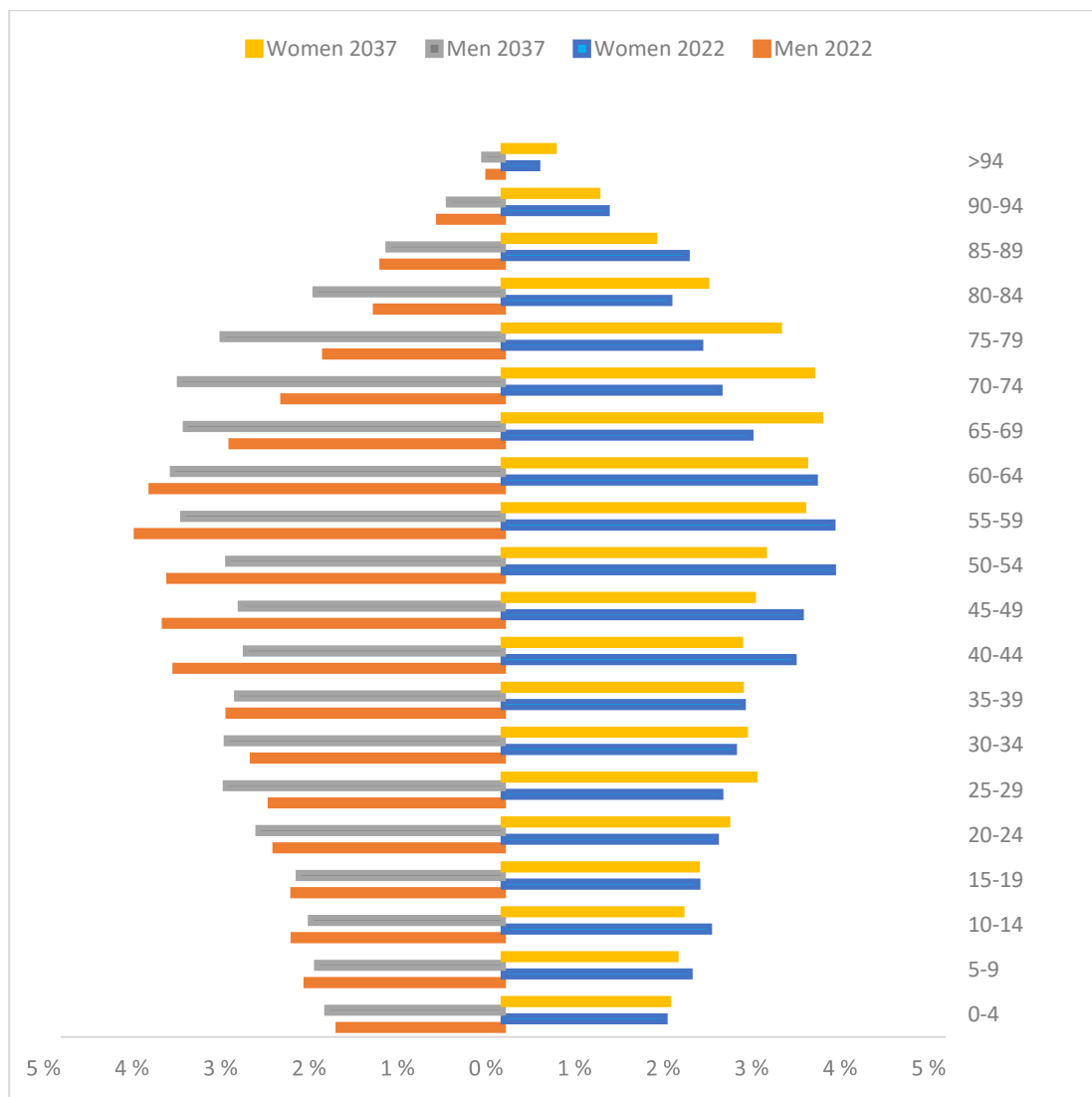


Figure 14. Total registered population by five-year age groups and sex: 2022 versus 2037. Source: Population Projections. INE.

3.2. Housing: Residential Dynamics in Teruel

The composition and structure of households are crucial elements for understanding the population and social dynamics of a region, becoming an indispensable tool for planning services and public policies, as well as for anticipating future needs in the realm of social and economic welfare. The demographic landscape of Spain shows a wide range of household configurations, with a notable trend towards individualization, as evidenced by the prevalence of single-person households. Single-parent households reflect an important social reality, while couples with children remain the most common form of family nucleus. We observe (Table 6) subtle regional differences, with Aragon and Teruel showing a higher proportion of single-person households compared to the national average. In Teruel, in particular, this trend is even more pronounced, also marked by a lower proportion of single-parent households. Couples without children have a strong presence in both regions, although Teruel has a slightly higher incidence of households with children, suggesting a more traditional family structure in this province.

Table 6. Households by type of household. Spain, Aragón, and Teruel, 2020. Source: Continuous Household Survey. INE.

	Spain	Aragon	Teruel
Single-person household	25.8%	27.6%	27.7%
Single-parent household	10.3%	9.5%	7.0%
Couple without children living in the household	21.0%	22.5%	24.8%
Couple with children living in the household: Total	33.2%	32.7%	35.3%
Couple with children living in the household: 1 child	15.5%	15.8%	16.1%
Couple with children living in the household: 2 children	14.7%	14.3%	16.3%
Couple with children living in the household: 3 or more children	2.9%	2.7%	3.0%
Family nucleus with other people who do not form a family nucleus	4.3%	3.7%	1.8%
People who do not form any family nucleus among themselves	3.0%	2.6%	1.8%
Two or more family nuclei	2.4%	1.4%	1.5%

The data from the Continuous Household Survey (Table 7) reveal an interesting characteristic of housing in Teruel compared to Aragón and the national average in Spain. It stands out that Teruel has a notable preference for larger homes, with a significantly higher proportion of households having seven or more rooms. The percentage of households with fewer than three rooms is lower than in the rest of Spain and Aragón, which could reflect greater availability of space and possibly a tradition of larger homes in the province. Additionally, the number of households with between three and six rooms is lower in Teruel, suggesting a housing distribution that leans towards greater spaciousness compared to the national and regional averages. These residential patterns could indicate socio-cultural and economic aspects of Teruel, such as lower population density and a lifestyle that favors more spacious homes. The predominance of homes with many rooms in Teruel suggests that small families looking to settle may face a limited supply of smaller-sized homes, which could present challenges in terms of availability and suitability to their specific space and affordability needs.

Table 7. Percentage of households by number of rooms. Spain, Aragón, and Teruel, 2020. Source: Continuous Household Survey. INE.

	Spain	Aragon	Teruel
Less than 3 rooms	1.45%	1.00%	0.18%
Between 3 and 6 rooms	81.04%	78.33%	62.29%
7 or more rooms	17.51%	20.68%	37.71%

An equivalent analysis can be conducted based on households by the surface area of the dwelling. The distribution of households by dwelling size in Teruel (Table 8) shows significant differences compared to Spain and Aragón. In Teruel, the proportion of households occupying homes smaller than 46 m² is notably low, indicating that very small homes are uncommon in the province. On the other hand, a considerable percentage of households in Teruel live in medium-sized homes (between 76 and 105 m²), a proportion similar to the national average. However, the province stands out for a higher percentage of large homes, both in the 106 to 150 m² range and over 150 m², surpassing the figures for both Aragón and Spain. This suggests a trend towards more spacious homes in Teruel, which could reflect a lifestyle that values more living space or a greater availability of larger homes. This proclivity towards residential spaciousness both speaks to the lifestyle in the province and poses challenges for housing policies, which must recognize and respond to the needs of a market that desires larger homes.

Table 8. Households by dwelling size. Spain, Aragón, and Teruel, 2020. Source: Continuous Household Survey. INE.

	Spain	Aragón	Teruel
Less than 46 m ²	284%	253%	092%
Between 46 and 75 m ²	2748%	3623%	1571%
Between 76 and 105 m ²	4049%	3354%	4011%
Between 106 and 150 m ²	1817%	1571%	2458%
More than 150 m ²	1102%	1201%	1885%

The differences between the province of Teruel and Aragón, and even more markedly Spain, are most evident in the ratio of urban real estate properties to inhabitants. In Spain, there are 0.818 properties per inhabitant, in Aragón 0.995, and in Teruel 1.489, based on population data as of 1 October 2023. Teruel holds 14.92% of Aragón's urban real estate, which is more than 4.5 points higher compared to the percentage of Teruel's population relative to Aragón's. Additionally, Teruel accounts for 0.51% of all buildings in Spain, doubling the percentage that its inhabitants represent in the national total, as described in Table 9.

Table 9. Urban real estate properties per inhabitant, Spain, Aragón, and Teruel, 2023. Source: Directorate General of Cadastre and INE (Continuous Population Statistics, data as of 1 October 2023).

	Spain	Aragón	Teruel
Total Real Estate Properties	0.818	0.995	1.489
Residential	0.495	0.599	0.895
Storage and Parking	0.181	0.218	0.206
Industrial	0.034	0.068	0.182
Commercial	0.028	0.031	0.020
Offices	0.006	0.007	0.004
Leisure and Hospitality	0.004	0.002	0.004
Other Uses	0.006	0.014	0.016
Vacant Land	0.062	0.061	0.162

The housing census in Spain stands at 26,626,315 for 2023 and in Aragón at 841,363 for the same year. According to INE data, the housing stock in Spain has grown by 5.58% in the twelve years between 2011 and 2023, by 8.01% in Aragón, and by 12% in Teruel. It is likely that the percentage for Teruel is higher since the census provides data for 2021 without updates for 2023. However, if Cadastre data is used, the increase for the province of Teruel is lower, at 7.56%. Observing the period from 2001 to 2021, the number of homes increased by 30.4% according to INE data (Figure 15). In any case, the dynamism of housing construction in Teruel is evident, with a growth rate higher than the regional average and, especially, the national average. This fact contrasts with the decline in the population in the province of Teruel during the same period due to negative natural population change, but it aligns with the reduction in the average number of household residents and the growth of single-person households (27.73% in 2020 compared to 26.41% in 2015, according to INE) and single-parent households (7.02% compared to 5.83%). However, the increase in construction originates from the stock of second homes, as shown by the evolution of housing by categories between 2011 and 2021, and the population growth in the city of Teruel, the provincial capital.

A key statistic is that in the province of Teruel, excluding the capital, for every primary residence, there are almost 1.6 non-primary residences, which include second homes and vacant houses; this has occurred without the province becoming a major tourist destination. Depopulation clearly demonstrates its devastating effects in numerous municipalities of Teruel, as evidenced by the decline in primary residences and the increase in vacant houses. Therefore, a significant part of the building growth in the last decade is more closely related to the city of Teruel and the construction and renovation of sporadic or vacation-type

second residences. The absence of population growth in rural municipalities contrasts with the increase in residents during holiday periods who occupy old and new homes and recover popular traditions such as local festivals, which invites us to consider that part of the building growth outside of the capital may be driven by emigrants who maintain ties with their place of family origin.

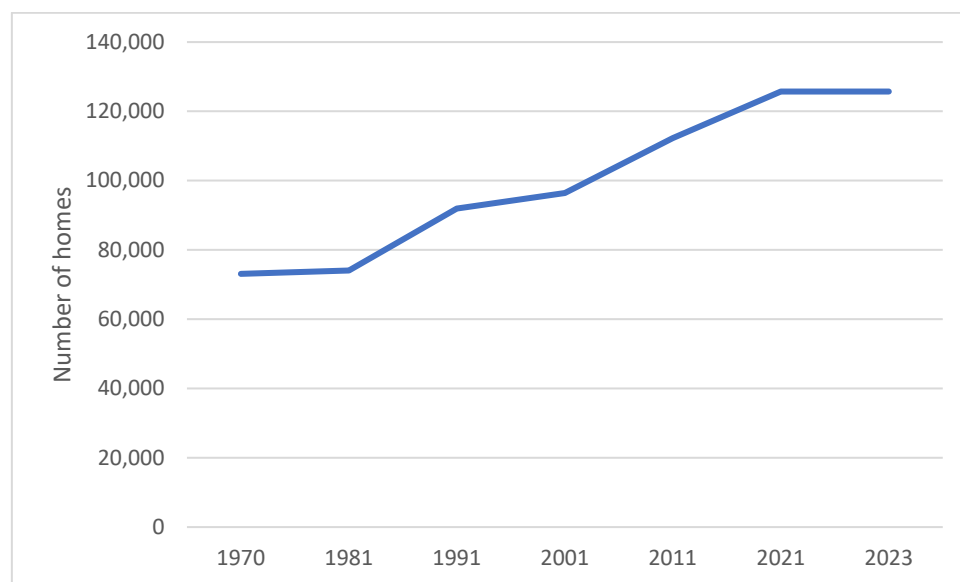


Figure 15. Evolution of the number of homes in Teruel, 1970–2023. Source: INE.

The current municipal distribution of housing confirms the previously mentioned weight of non-primary residences in rural areas. In localities with fewer than 2000 inhabitants, non-primary residences outnumber those inhabited year-round. It can even be deduced that the smaller the population of a municipality, the lower the presence of primary family residences, and vice versa. For example, in villages with fewer than 101 inhabitants, only 20.77% of the houses are primary residences, meaning only 1 in 5 houses is permanently inhabited. In municipalities with between 501 and 1000 inhabitants, 36.09%, or one in three houses, are primary residences. In contrast, in the capital city of Teruel, the percentage is 66.4%, meaning that two out of three houses are permanently inhabited. The density of primary residences, in line with the population density, is very low: 8.5 residences per km² in the province of Teruel, compared to 17.6 in Aragón and 52.7 in all of Spain, according to INE data for 2021. Despite the population decline, the density of vacant houses is also very low in Teruel: 3.7 residences per km², compared to 11.3 in Aragón and 36.7 in Spain.

The construction date of a house affects its quality and habitability. The housing stock in Teruel (see Table 10) is notably older compared to that of Spain and Aragón when analyzing buildings with known construction dates. According to the Directorate General of Cadastre, 10% of buildings in Spain are from before 1950, and 16.7% in Aragón are, but in the province of Teruel, this percentage reaches 33%. The difference is also significant when comparing buildings constructed before 1980: 39.3% in Spain, 47.5% in Aragón, and 53.9% in Teruel. Buildings from the 21st century in Teruel represent only 21.6%, compared to 31.1% in Spain and 25.9% in Aragón.

The housing census in the province of Teruel is characterized by a context of stable growth, with a tight real estate market both in movement and costs to meet demand. However, there are serious doubts about the census's actual capacity to satisfactorily absorb moments of increased housing demand in most municipalities, outside of the capital and major towns. Additionally, in the past decade, second and vacant homes have outnumbered primary residences, with this trend being more pronounced in smaller municipalities. The vacant homes do not exist due to a disproportionate supply of new construction relative to

demand but rather as a result of depopulation. The average age of these homes is also very high compared to the rest. This affects the market because the supply of habitable, modern, and comfortable homes is more limited.

Table 10. Construction date of buildings, Teruel. 2022. Source: Directorate General of Cadastre.

	Teruel	%
Total Buildings	178,790	100
Before 1950	59,068	33
Between 1950 and 1979	37,422	20.9
Between 1980 and 2000	43,744	24.5
After 2000	38,556	21.6

3.3. Proposals to Repopulate Teruel

The academic community has addressed the complex issue of depopulation in Teruel. Saez et al. [3] propose a multidisciplinary approach to improve rural quality of life, emphasizing job stability, housing costs, childcare services, female labor integration, and tailored services for the elderly as key factors in addressing demographic issues. Similarly, Garrido and Faci [49] suggest fiscal birth aids, promoting rural housing, increasing female labor participation, providing childcare and self-employment opportunities, facilitating elder facilities, and integrating immigrants. They also advocate for exploiting natural resources, supporting SMEs, promoting rural tourism, and ensuring reasonable access to services.

Del Romero and Escribano [51] examine the demographic, economic, and social factors contributing to depopulation in Teruel, proposing improvements in infrastructure, access to essential services, and promoting alternative economic sectors like rural tourism, local crafts, and agroindustry. Meléndez-Pastor et al. [52] analyze the expansion of forest areas at the expense of abandoned pastures and cropland, linked to demographic and economic changes due to rural abandonment and a shift towards the tertiary sector focused on rural tourism. Del Romero and Escribano [51] propose a shrinking regions strategy, maintaining existing population and services, promoting rural housing recovery, sustainable economic activities like tourism and organic agriculture, and leveraging Teruel's strategic location to attract activities and residents.

Sáez et al. [53] highlight that the most effective strategies for repopulating the region have emerged from municipalities and local networks, detailing successful local initiatives that have countered depopulation through attracting new residents and promoting innovative policies. Arran-López et al. [54] reveal low accessibility levels for commerce, highlighting dependence on private cars, especially affecting the elderly, and suggest improving public transportation infrastructure, fostering local retail development, and implementing territorial development policies for rural areas.

Diez-Gutiérrez and Rodríguez-Rejas [17] suggest measures like creating land banks, providing social housing, tax incentives, guaranteed basic rural income, facilitating immigrant residency, developing rural broadband, promoting public transportation, and supporting local non-relocatable jobs. Tárraga and Morales [55] show that rural women, historically invisible, are emerging as entrepreneurs in sustainable tourism, emphasizing the importance of associations and public and private policies to promote women-managed tourism businesses as a strategy to combat depopulation and gender inequality.

Conejos et al. [19] provide proposals for integrating foreign-origin people in rural Aragón, including qualitative inclusive policies, sufficient budgetary means for immediate needs, language learning, rapid credential recognition, and a comprehensive approach considering all dimensions of problematic situations. Olmo [56] highlights a positive relationship between regional per capita income and migration flows, with a centralizing effect towards regional capitals, and suggests that sectors like construction and commerce contribute positively to regional economies, while the agricultural sector and extractive industries correlate with negative population trends.

Bello [57] studies public policies against depopulation at European and Spanish levels, proposing future measures like a specific European public policy on depopulation, positive discrimination in public procurement for companies in depopulated areas, and ensuring services to attract population.

Complementing these scientific policy recommendations, The Recovery Plan: 130 Measures to Address the Demographic Challenge by the Government of Spain [58], presented in May 2021, underscores an institutional commitment to combating depopulation, particularly in rural areas at risk of disappearing due to urban population concentration and rural decline. This plan proposes comprehensive strategies including economic diversification, digital connectivity, and improved public services to promote rural revitalization. The Government of Aragón's 2017 Special Guideline for Demographic Policy and Against Depopulation [59] further emphasizes balanced territorial development, public service access, and gender policies. Additionally, the SSPA Network's reports [60] highlight the need for a multifaceted and collaborative approach, including infrastructure improvements and incentives for economic activities, to effectively address depopulation in regions like Teruel.

Concerning the housing problem, the lack of available housing in rural areas, as stated above, demands that the issue of housing must be at the center of public policies against depopulation. This is why, in recent years, a wide range of measures have been deployed to promote the construction and access to owned or rented housing by the Government of Aragón and the Provincial Council of Teruel.

The mentioned Special Guideline on Demographic Policy and Against Depopulation by the Government of Aragón [59] proposed four main measures to be included in future housing plans. Firstly, the Housing Rental Program aimed to partially revive the emancipation rent (financial subsidy provided by the government to assist young adults in becoming financially independent and affording their own housing) in effect between 2007 and 2011, extending the benefit up to the age of 35 and prioritizing families with young children. It also envisioned the creation of a rural rental pool, including properties from financial entities and SAREB, and the expansion of the "Rent Your Empty House" program from Zaragoza with special conditions for dependent and tourist settlements. Secondly, the Public Rental Housing Promotion Program included evaluating housing and public land in Aragonese municipalities and provided for both new housing construction on recovered urban plots and modifying urban planning regulations to reserve land for public rental housing. Additional measures included the rehabilitation of public housing heritage and specific public rental housing offers in tourist settlements for local workers. Thirdly, the Building Rehabilitation Program focused on rehabilitating single-family homes in dependent settlements. This program would be financed by European FEDER funds and provide grants for energy efficiency and general rehabilitation, including associated mortgage financing. It proposed the rehabilitation of municipal public heritage for new settlers and the possibility of tax incentives for acquiring and rehabilitating rural homes for permanent residence. Fourthly, the Urban Regeneration and Renewal Program aimed at revitalizing old town centers in small municipalities through specific rehabilitations, with aid not dependent on the number of homes to be rehabilitated. It included the eradication of ruins and the acquisition of public land, applying sustainable social and urban development methodologies to old town centers, and considering aid for rehabilitating commercial premises and public service buildings.

The 2017 Guideline also proposed additional measures focusing on housing issues. The Family Support Program aimed to support families at risk of losing their homes or facing energy poverty, ensuring housing stability for vulnerable individuals and families. It included measures to prevent evictions and combat energy poverty through collaboration between social housing initiatives and public administrations. This program integrated mortgage and rental mediation services to negotiate preventive solutions to housing loss, assistance for those unable to cover energy costs, a registry of vacant homes to promote their use, and a social housing fund offering housing solutions for evicted individuals.

These actions formed an integrated strategy to enhance housing security and effectively utilize Aragon's real estate, providing resources and support to those at risk.

Additionally, the Home Adaptation Program for the Elderly and Dependent Persons aimed to develop solutions to improve accessibility and autonomy for the elderly and dependent persons in their homes. This included the incorporation of home automation technology to facilitate communication and daily management, as well as structural modifications to improve mobility, such as adapting bathrooms for wheelchair access and installing grab bars and motorized beds.

Lastly, the creation of a Housing Observatory-Portal in Aragón was proposed as an initiative designed to collect and provide essential information on the supply and demand for housing in the autonomous community of Aragón. The goal was to efficiently allocate resources to housing plans and measures and increase the transparency of the real estate market. Supported by the Government of Aragón, local entities, and private sector actors, the observatory would focus on providing updated data on the supply of public land and housing, rental housing in rural areas, and available housing assistance. Additionally, the observatory would maintain detailed information on housing demand by population segments, including the need for homes requiring rehabilitation or adaptation for elderly inhabitants, and a registry of vacant homes.

All these measures focus on housing and rehabilitation proposals, highlighting the negative impact of poor housing conditions and limited access to basic services on resident retention and the attraction of new inhabitants. It is suggested to rehabilitate semi-abandoned rural properties into social housing to attract new residents and meet the needs of disadvantaged groups. This includes the promotion of aid programs for key housing components and infrastructure improvements. The selection criteria for aid beneficiaries would consider both objective aspects, such as the condition and architectural value of the building and subjective factors related to the situation of the owners and users. For the elderly and disabled, the implementation of small domestic installations and personal devices is proposed, starting with pilot projects. Investment in rural housing is noted for its multiplier effect on the local economy, although immediate job creation may be limited. The creation of an efficient rental housing market increased legal and financial security for rental contracts, and regulation of tourist housing use are also emphasized. Additionally, it is proposed to transform municipal spaces into rental housing, update property ownership procedures, and provide tax incentives to address housing challenges and support population renewal in rural areas.

Additionally, in recent years, the Teruel Provincial Council has focused on housing initiatives to address rural housing shortages and facilitate population settlement. In 2021, a subsidy line was approved for promoting municipal housing for social purposes, prioritizing smaller municipalities. This initiative included funds for acquiring plots and buildings, as well as conserving and adapting municipal housing for social or rental purposes. In 2022, a new call for aid was published to support the acquisition and renovation of homes for rental or social use, benefiting additional municipalities. The Teruel Province Development Entity Group (AEDPT) and the Teruel Provincial Council launched a project to create an inventory of homes available for rent and sale, aiming to improve the housing market and support rehabilitation efforts. This project involves collaboration with municipalities, owners, and intermediaries to gather and provide information on available housing.

Finally, to address the pressing issue of rural depopulation, several legal measures have been introduced aimed at enhancing housing accessibility and supporting sustainable development in rural areas. Law 12/2023 on the right to housing emphasizes improving housing accessibility in rural areas to mitigate depopulation. Key measures include universal accessibility, collaboration between public administrations, and efficient management of public housing stock. The law also focuses on transparency in housing transactions and supports state planning and programming for housing and rehabilitation. The 2022–2025 Aragon Housing Plan, through Decree 73/2023, introduces various programs to improve rural housing accessibility and combat depopulation. This includes rental assistance, support

for vulnerable groups, and initiatives like cohousing and intergenerational housing. The plan also emphasizes residential energy rehabilitation and updates protected housing policies to ensure effective implementation and support for young people and disadvantaged groups in rural areas.

4. Discussion and Conclusions

The demographic and residential dynamics in the province of Teruel present a multifaceted and pressing challenge that demands immediate and sustained attention. This study has thoroughly examined the underlying factors contributing to Teruel's severe depopulation and has identified critical areas for intervention to promote sustainable development and population retention.

The province of Teruel has experienced significant and ongoing population decline, with a dramatic decrease in population density and an aging demographic structure. The current population density stands at 9.1 inhabitants per km², significantly below the national average of 93.7, highlighting a demographic crisis that places the very survival of many rural communities at risk. The high dependency ratio, characterized by 138 elderly individuals per 100 young people, further exacerbates the challenges, indicating an unsustainable burden on the working-age population.

Housing quality and availability emerge as pivotal factors influencing population retention and attraction. The study underscores that the majority of vacant homes in Teruel are a result of depopulation rather than an oversupply of new construction. These homes often suffer from poor conditions and lack modern amenities, deterring potential new residents and contributing to the ongoing demographic decline. The analysis reveals a critical need for targeted housing policies that focus on rehabilitating existing properties and enhancing the quality of the housing stock to make rural areas more attractive.

The joint analysis of data on population and housing in rural districts shows that the decline and aging of the population does not favor the settlement of new residents in a municipality, because, despite increasing the number of vacant homes, it negatively impacts the quality of housing supply and access to services in the municipality (H1). The lack of available housing reduces the attractiveness of many rural municipalities for retaining young residents and attracting new inhabitants. The verification of the hypothesis proposed for the case study of the depopulation of Teruel confirms the findings presented in other studies for different geographical areas [32,35], as discussed in the analysis of the academic literature.

Therefore, housing is a crucial factor in understanding the population and social dynamics of a region, serving as an essential tool for planning services and public policies. The mentioned continuous household surveys reveal significant trends in Teruel compared to Aragon and the national average in Spain. These trends highlight the unique socio-cultural and economic aspects of Teruel's housing market, underscoring the need for tailored housing policies to address the specific needs and challenges of the province. Several policy interventions have been proposed to address the multifaceted issues of depopulation and housing inadequacy. These include supporting young families by encouraging birth rates through comprehensive support programs, including access to affordable housing, quality childcare services, and flexible work arrangements. Fiscal incentives for families with children and potential rural basic income schemes are also recommended to enhance economic security.

Attracting immigrants by implementing active immigration policies to counterbalance the demographic decline is crucial. Integration of immigrants through public reception programs, credential recognition, and anti-discrimination campaigns is essential. Employment quotas for foreign residents in specific sectors could further aid their assimilation and economic contribution. Retaining young talent involves creating attractive opportunities for young people by expanding vocational training, enhancing employment prospects, and improving infrastructure such as ultra-fast broadband and reliable transportation networks.

Flexible public employment options that allow young individuals to maintain ties with their home regions are also advocated for.

Nevertheless, the attraction and retention of in-migrants is difficult to achieve successfully if it is not accompanied by actions that guarantee access to decent housing for new residents. Prioritizing housing rehabilitation through financial incentives, grants for energy efficiency upgrades, and community-led urban planning projects would not only improve living conditions but also foster community engagement and a sense of belonging. In addition, promoting the use of renewable energy sources and improving energy efficiency in homes, particularly in rural areas, has the dual benefit of reducing living costs and contributing to environmental sustainability.

The analysis of the proposals to reverse depopulation in Teruel shows that the public policies have focused in recent years on housing improvements and initiatives compared to earlier programs, which were more general and included housing as a secondary element. Addressing the demographic and residential challenges in Teruel requires a coordinated, multi-faceted approach that integrates housing policy, socio-economic development, and targeted demographic strategies. The proposed measures, while ambitious, are essential for reversing the downward trajectory and ensuring the sustainable future of Teruel's rural communities. The engagement of local stakeholders, continuous monitoring, and adaptive policymaking will be critical to the success of these interventions. As the situation evolves, ongoing research and policy innovation will be necessary to meet the changing needs and dynamics of the province. However, the hypothesis that housing policies are the key to the fight against depopulation cannot yet be confirmed (H2), since at least one or two decades are needed to do so, when their results in the creation and improvement of accommodations and in reversing demographic decline can be observed.

For this reason, future research should explore the long-term impacts of implemented policies on demographic trends and housing quality in Teruel. Specific areas of interest include evaluating the effectiveness of immigration policies in reversing demographic decline and their integration into local economies. Longitudinal studies on housing rehabilitation could investigate the long-term sustainability and socio-economic impacts of these programs on rural communities. Analyzing the efficacy of vocational training and employment programs in retaining young residents and attracting new ones is essential. Examining the broader impacts of energy efficiency initiatives on local economies and their potential to serve as models for other regions facing similar challenges is also crucial.

This study has several limitations that should be acknowledged. The reliance on available statistical data and previous research means that some aspects of the demographic and housing issues may not be fully captured. Additionally, the study's scope is limited to the province of Teruel, and while it provides valuable insights, the findings may not be entirely generalizable to other regions with different socio-economic contexts. Further research incorporating primary data collection and comparative analysis across multiple regions would enhance the robustness and applicability of the conclusions drawn.

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