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Review article

Religious identification (BELIEVERS) by population size of the municipalities in Spain

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ABSTRACT

Previous research on religiosity in urban areas of Spain has typically relied on qualitative methods and focuses on densely populated provincial capitals. This study explores the significant variability in religious identification across Spain's municipalities, with individuals in larger municipalities reporting lower levels of religiosity than those in smaller ones. The study also examines how this variability is influenced by demographic factor such as gender, age, and education. The results reveal substantial differences in religiosity across municipalities, particularly among the eight Spanish municipalities with a population of over 400,000 residents aged 18 and older. Specifically, Barcelona and Palma de Mallorca show the lowest levels of religious identification, while Madrid falls in the middle and Murcia, Sevilla, Malaga, and Zaragoza show the highest levels. The data used in this study comes from a fusion of 125 monthly surveys conducted by CIS (Centro de Investigaciones Sociológicas) in Spain between January 2013 and June 2022 (excluding August), and includes 406,511 interviewees, 398,516 of whom identify as religious or non-religious. In summary, this study sheds light on the relationship between religiosity and population size in Spain, highlighting the need to consider this variable when conducting research in this field.

1. Introduction

The Catholic tradition in Spain has been predominant in past century. Since 1980, during the democratic period, the proportion of believers in Spain (almost all Catholics, around 98%) has been gradually decreasing. At the beginning of the 21st century, it stood and has declined to 64% in recent years ([1–3]).

The decline in religious commitment is evidenced by reduced participation in religious ceremonies and marriages ([1,4–8]). Similar trends are observed in other European countries ([9–14]), with many authors describing a trivialization of religiosity where religion is acknowledged only in words, not in faith or practice ([15–17]). These phenomena are associated with secularization, which is presented as an inexorable process linked to the passage of time, demographic changes, and the permeabilization of social change in the globalized world of Western societies and in large cosmopolitan cities ([18–21]).

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The theory of secularization considers cities as centres of modernization where a lower religious identification among citizens is observed [22]. Consequently, it can be expected that in large Spanish cities, there is a decline in religiosity compared to what is observed in small towns and municipalities. This forms one of the hypotheses in this study. The aim is to verify this phenomenon and also examine whether religious identification is equally present in large Spanish cities and municipalities of different sizes, as one would expect if religiosity were uniform within the same type of cities.

Despite being a trend throughout Western Europe, the decline in religiosity is more visible in some municipalities than in others, as polarization of religious identification is observed. Studies about religiosity in Spain have often been developed using qualitative techniques and focused on densely populated areas in some provincial capitals where non-native populations settle ([21,23–25]), as well as minority religious confessions ([23,26–28]). The religious decline of the Spanish population has also been visible throughout Western Europe for a few decades ([17,29–34]), where the globalized market economic model has curtailed religiosity [5], limiting the religious offer in parishes [35], as well as the intercultural exchange and relations generated with migration and population mobility between cities ([13,24,36,37]), and within the city itself where neighbourhood segregations occur linked to the new religiosities [38].

This article sheds light on the variability of religious identification in Spain based on population, providing insight into the impact of urban areas on religiosity. Moreover, the observed polarization of secular evolution suggests an income effect, with municipalities in the South of Spain, which have lower incomes, showing slower secularization than those in the East [39].

This study highlights the need for a nuanced understanding of secularization in different regions of Spain and the potential role of income inequality in shaping religious identification. Also, the study considers the role of demographic variables such as gender, age, and educational attainment in the relationship between populations size and religious identification.

2. Materials and methods

Data from 125 barometers of the Centro de Investigaciones Sociológicas (CIS) from January 2013 to June 2022 (excluding August) were used in this study. The monthly barometers, different CIS studies that ask about religiosity, and electoral barometers are freely accessible on the CIS website (CIS website).The sample size consisted of 406,511 people interviewed, of which 398,516 declared themselves as believers or non-believers. Religious identification was defined as the dependent variable and dichotomized into two categories: Believers and Non-believers. This variable was defined based on the question used by the CIS in various barometers and studies conducted between January 2013 to May 2022 (except August): "How you define yourself in religious matters?" with possible answers being: *Practicing Catholic*, *Non-Practicing Catholic*, *Believer of another religion*, *Agnostic*, *Indifferent or non-believer* or *Atheist*. The dichotomous variable was defined as *Believers* (Catholics, practicing or non-practicing, and Believers of another religion) and *Non-believers* (Agnostics, Indifferent or non-believers and Atheist).

The dichotomization of religious identification is a methodological strategy that reduces the complexity of the data and facilitates bivariate analyses of proportion of the believers (and non-believers) by gender, age, and educational attainment. This approach is commonly used in studies conducted in Spain (40; 6; [3,31,40–43]). This religious-secular dichotomy allows for multivariate multi-dimensional analyses with many independent variables. Although this approach is unconventional due to the unavailability of large databases, it improves multivariate analyses conducted with sample sizes less than 1500 interviews ([8,44]) and complements the existing qualitative works on religious minorities based on the immigrant population ([23,25–28,45]), a population that is not tested by CIS if they do not hold Spanish nationality. The religious-secular dichotomy does not intend to question or simplify the theorical concepts or the complexity of the conceptual meanings of the religious-secular categories. As Beriain (2015) [46] warns, it is an attempt to deepen the description of the profiles that identify with believers and non-believers, creating a space for new studies that promote the explanations that such religious identifications entail.

Thus, the dichotomization of religious identification into believers and non-believers allowed for a powerful descriptive multivariate analysis, multiply correspondence of joint categories and a binomial logistic regression.

The study initially examines religious identification using multidimensional descriptive techniques, followed by Multiple Correspondence Analysis, which is displayed in a joint categories graph. Finally, a Binomial Logistic Regression model is used. All of these techniques have high descriptive, graphic, comprehensive, and explanatory potential, thanks to the extensive database used. The models use religious identification as a dichotomous dependent variable (percentage of believers or non-believers), and the main independent variable is the population size of the municipality of residence. This variable is an ordinal polytomous variable with seven categories, ranging from those living in municipalities with less than 2000 inhabitants to those with over 1,000,000 inhabitants (Barcelona and Madrid). Descriptive variables such as gender, age, and educational attainment are independent variables of segmentation. The data collected spans from 2013 to 2022, allowing for the use of a moderating variable of religious identification over time. These defined variables are used to investigate the variability religious identification in Spain related to the population size of the municipalities, the impact of descriptive variables, and the changes in religious identification over time.

The data used in this study is derived from a combination of 125 barometers conducted by the CIS from January 2013 to June 2022 (excluding August) (https://www.cis.es/cis/opencms/EN/index.html). The resulting database comprises 406,509 interviews, of which 318,516 individuals identified themselves as either believers or non-believers. To ensure that the sample was representative of Spain as a whole, the database was balanced using a provincial weighting coefficient based on population sizes from Instituto Nacional de Estadística (INE), as well as CIS barometers relative to the total sample. The sampling error of each barometer was found to be less than 2.5% for Spain, and less than 1% when all the data aggregated annually and/or globally. The CIS datasheets provide details of the sampling procedure followed. For the most used recent barometer conducted in June 2022, a Computer Assisted Telephone Interview (CATI) was used, with a sample of randomly selected landlines (26.1%) and mobile phones (73.9%), and quotas based on gender and age. (CIS: https://www.cis.es/cis/export/sites/default/-Archivos/Marginales/3360_3379/3366/FT3366.pdf).

As stated earlier, a question arises about CIS's data collection procedure. In April 2020, due to COVID -19 pandemic, the CIS changed its usual method of face-to-face interviews to conducting interviews preferably by telephone, either on landlines or mobile.

Spain's population is distributed in 8131 municipalities with varying population sizes (INE, [47]). To ensure a representative sample, the CIS uses this information to generate a stratification representation of the sample in each study, dividing the population into seven categories based on the size of the habitat, ranging from less or equal to 2000 inhabitants to more than 1,000,000 de inhabitants. This categorization is included as a variable (Municipality_size) in all the CIS barometers, allowing for identification of the municipality of each interviewee and large population cities in Spain, such as Madrid (25,542 interviewed) and Barcelona (13,466 interviewed), each with over one million inhabitants. Other larger cities included in the samples are Valencia, Sevilla, Zaragoza, Malaga, Murcia and Palma de Mallorca, each with populations between 400,001 and 1,000,000. By taking into account these eight large urban centres, this study seeks to explore the variability of religious identification and profile the groups associated with it before expanding the analysis to the rest of the municipalities.

Table 1 displays the information on religious identification (main dependent variable) of the interviewees using two independent variables. The first independent variable is the population size of the municipalities (Municipality_size), which is the main independent variable used in the analysis. The second independent variable is an additional one that only considers the eight cities largest in Spain (Large cities).

This study involved the use of a generated database that has included information on gender, age, and educational attainment of the interviewees, in addition to data from the barometers themselves, including the date and year of completion from 2013 to 2022. The barometers had varying samples sizes ranging from 2500 to 4000 elected individuals, and in some cases, grew to 15,000 with provincial and regional probabilistic representation.

The models used in this study were defined from the variables shown in Table 2, including one dependent variable (religious identification with two categories) and six independent variables (one main: Municipality size with seven categories, an additional one: Large cities with eight categories, three descriptive: gender, two categories, age, continuous scale from 18 to 98 and recoded into four categories, educational attainment, with three categories defined from UNESCO, 2012 (ISCED 2011): https://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf) [48], and one temporal contextual: year, with ten values).

This study includes three analytical approaches.

A. Multidimensional descriptive model

This model is defined by five variables and displays the percentages of interviewees who identify as believers. The variables used are:

One dependent variable: religious identification, defined as a dichotomic variable (two categories).

One main independent variable: population size of the municipalities (seven categories).

A second independent variable: cities with the largest population (eight categories).

Three descriptive variables: gender (two categories), age (recoded into four categories), and educational attainment (three categories).

B. Multiple Correspondence Analysis

Table 1
Religious identification (Believers) in Spain by population size of the municipalities and largest cities (N and %) from 2013 to 2022.

Variable	Categories (inhabitants)		N	Believers* (%)
Municipality size	1	*Less than 2000*	27,063	78.8
	2	*2001 to 10,000*	58,749	72.7
	3	*10,001 to 50,000*	103,780	69.3
	4	*50,001 to 100,000*	49,380	69.0
	5	*100,001 to 400,000*	90,159	68.9
	6	*400,001 to one million*	31,826	70.7
	7	*More than one million*	37,759	60.8
Total			*398,516*	*69.6*
Large cities	More than one million	*Madrid*	24,380	64.6
		Barcelona	13,180	53.9
	400,001 to one million	*Valencia*	6925	62.2
		Sevilla	6708	73.4
		Zaragoza	6371	74.9
		Malaga	5179	74.1
		Murcia	3677	76.6
		Palma de Mallorca	2966	62.5
	Cities with less 400,001		329,131	70.5
Total			*398,516*	*69.6*

Source: Own elaboration using 125 CIS barometers from January 2013 to June 2022, excepts August (N = 398,516).
(*) Believers: Catholics or believers of another religion.

Table 2
Defined variables and its categories.

Variable		*Categories*		
Dependent	*Religious identification*	Believers		
		Non-believers		
Independent			***(inhabitants)***	
Main	*Municipality size*	1	*Less than 2000*	
		2	*2001 to 10,000*	
		3	*10,001 to 50,000*	
		4	*50,001 to 100,000*	
		5	*100,001 to 400,000*	
		6	*400,001 to one million*	
		7	*More than one million*	
Additional	*Large cities*	More than one million	*Madrid*	
			Barcelona	
		400,001 to one million	*Valencia*	
			Sevilla	
			Zaragoza	
			Málaga	
			Murcia	
			Palma de Mallorca	
Ascriptive	*Gender*	*Man*		
		Woman		
	Age	*18 to 98*	Recoded	*18 – 30 years*
				31 – 45 years
				46 – 65 years
				66 – 98 years
	Educational attainment	ISCED 2-1-0	Compulsory secondary or less	
		ISCED 3-4	Post - compulsory secondary	
		ISCED 5-6-7-8	Tertiary, university, in all its dimensions	
Temporal contextual	*Year*	Ten values	From 2013 to 2022	

A Multiple Correspondence Analysis (MCA) was conducted with the same variable used in the previous model. The positions of believers and non-believers are located in the joint categories obtained by MCA.

C. Regression Logistic Model

The logistic regression model used in this study is an extension of the descriptive model, which includes the same variables: one dependent variable, religious identification (defined as a dichotomic variable), and six independent variables (one main variable, municipality size, and one additional variable large, size cities, three descriptive variables, gender, age and educational attainment, and one temporal contextual variable, year). However, unlike the descriptive model, the logistic regression model analyzes the relationship between the dependent variable and the independent variables in a more precise and quantitative manner, taking into account the impact of each independent variable on the dependent variable while controlling for the effects of other independent variables. For statistical analysis, IBM SPSS v. 26 was utilized.

3. Results

The descriptive model provides valuable information on the percentage of believers within each of the 360 groups created by crossing the categories of the variables used. If non-believers are considered in opposition to believers, then there are 720 groups. This model enables the comparison of the percentage of a chosen group against another, such as religious identification for women aged between 18 and 30, with compulsory secondary education or less living in one municipality versus another. The database is large enough to identify relevant group size for many categories, including the largest population, with a minimum of 65 cases. However, there is only one group that meets this minimum requirement, which is men, aged between 18 and 30, with an educational attainment of compulsory secondary or less, and residents of Palma de Mallorca. The small number of cases in this group can be explained by the fact that Palma de Mallorca has the least population of the largest cities considered and with a smaller sample size in the CIS studies. The opposite case is that of Madrid, which always has groups with more than 500 cases, even in the group with lowest number.

Religious identification in Spain has been declining from 75% in 2013 to 61%, in 2022, representing a 14% drop in a decade. These values exhibit considerable variability, both in origin (2013) and in the present (2022). In 2013, the value of 75% is obtained through a weighted average of scattered records ranging from 61% of believers in Barcelona to 84% in municipalities with less than 2000 inhabitants, a difference of 33%. In 2022, the value of 61% of believers in Spain shows considerable religious diversity related to the population size of the municipalities and large cities. Barcelona continues to have the lowest identification at 48%, representing a 13% drop in a decade. Conversely, Malaga shows 70% of believers and is one of the cities with smallest decrease in religious identification in Spain (Fig. 1 and Table 3). In 2022, the variability between the lowest value, Barcelona, and the highest, Malaga, is 22%. In summary, the drop in believers in Spain over the last decade is 14%, with variability remaining at 22%–23% between the extreme values shown

in Table 3 and based on the size of population of the municipalities and the largest cities with more than 400,001 inhabitants. Overall, the fall of believers in the last three years is evident.

Statistically significant variability in religious identification by autonomous communities was observed throughout the decade 2013 to 2022, as demonstrated by a χ^2 test with p – values less than 0.001 for each of the years within the considered time interval. These findings corroborate the trends observed in Tables 1 and 3

Table 4 present a comparison of religious identification (categorized in two groups) based on the population size of the municipalities (categorized into seven groups) and the largest cities (categorized into eight groups), using gender (categorized into two groups), age (recoded into four categories), and educational attainment (categorized into three groups) as segmentation variables. The joint model allows us to obtain descriptive information on the proportions of believers in any of the 360 groups generated by the independent variables (and, conversely, of non-believers, by reflecting the percentage that adds up to 100% of the religious identification-secular dichotomy).

This joint descriptive analysis of the proportions of believers, by population size of the municipalities and largest cities, reveals that the overall proportion of believers in Spain exhibit significant variations, which notably increase the interval of 22%–23% mentioned earlier, and are related to the population of the different municipalities. Furthermore, the effects of gender, age, and educational attainment contribute to making this variability even greater, as shown in Table 4.

The main conclusions extracted from the results presented in Table 4 are as follows.

1. Only five cells, by population size of the municipalities, have groups of less than 400 people. These values are 182, 268, 297, 324, and 372, respectively. For largest cities, only Palma de Mallorca, which has the lowest sample size, has groups with 77 and 68 interviews. These groups are for women or men, and always for ages between 18 and 20 years and an educational attainment of compulsory secondary education or less.
2. The variability of religious identification by population size of the municipalities shows that there is a lower proportion of believers in the largest municipalities (61%) than in the smallest (79%).
3. Barcelona has the lowest proportion of believers (54%) for all groups considered in the largest cities. This proportion reaches its minimum value for the groups of men or women aged between 18 and 30 years (23% and 25% respectively). Only Palma de Mallorca comes close to the percentage of believers in Barcelona in the group of men aged between 18 and 30 years old with post-compulsory secondary studies (27%).
4. Women are more likely to be believers than men in all age groups. These proportions are almost equals in groups with tertiary educational attainment and ages between 18 and 30 years. In older age groups, women confirm the percentage variability of believers around 10%.
5. Believers increase their percentage with age, whether they are men or women. And this increase is greater the less educational attainment they have.
6. The youngest group of respondents has the lowest proportion of believers in Spain, regardless of educational attainment and gender. When the educational attainment is lowest, the minimum proportion of believers is found among men who live in the largest cities (44% of believers in Madrid and Barcelona, also Palma de Mallorca with 43%), compared to 72% of believers in Murcia, which is the municipality with the highest proportion of believers in almost all age groups, gender, and educational attainment.
7. Barcelona (and Palma de Mallorca) has a lower proportion of believers than Murcia (also Sevilla and Malaga) in practically all age groups, except in those over 65 years of age, where the proportions of believers tend to be equal at their maximum values, around 78% (lowest value) for respondent with tertiary studies and 87% for those with compulsory secondary or less studies.

In conclusion, as shown by the results presented in Table 4, the proportion of believers in Spain varies significantly by population

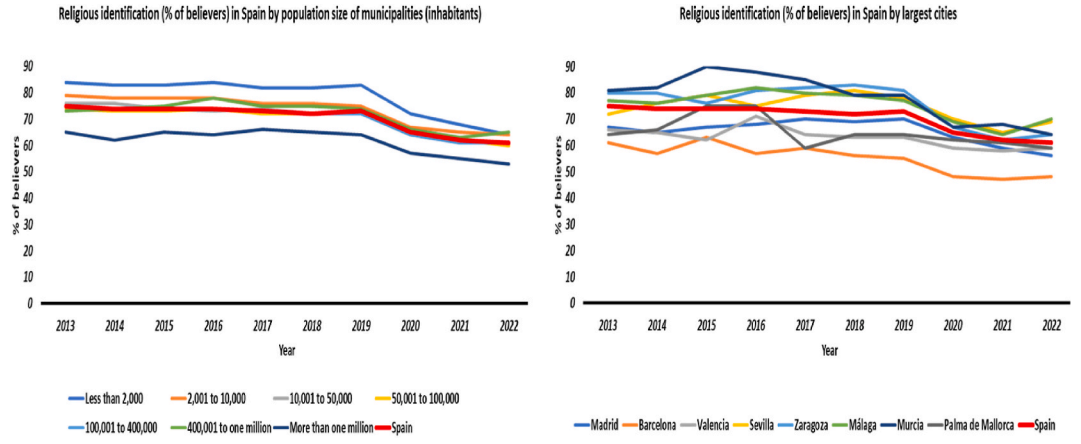

Fig. 1. Religious identification (% of believers) in Spain by population size of the municipalities and largest cities from 2013 to 2022.

Table 3
Religious identification (% of believers) in Spain by population size of the municipalities and largest cities from 2013 to 2022.

			Year (%)									
Variable	*Category*		*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*
(inhabitants)												
Municipality size	1	*Less than 2000*	84	83	83	84	82	82	83	72	68	64
	2	*2001 to 10,000*	79	78	78	78	76	76	75	67	65	64
	3	*10,001 to 50,000*	76	76	74	73	74	72	72	64	62	61
	4	*50,001 to 100,000*	74	73	73	74	72	72	73	65	62	60
	5	*100,001 to 400,000*	75	74	74	74	73	72	72	64	61	61
	6	*400,001 to one million*	73	74	75	78	75	75	74	66	63	65
	7	*More than one million*	65	62	65	64	66	65	64	57	55	53
Large cities	More than one million	*Madrid*	67	65	67	68	70	69	70	63	59	56
		Barcelona	61	57	63	57	59	56	55	48	47	48
	400,001 to one million	*Valencia*	66	65	62	71	64	63	63	59	58	59
		Sevilla	72	76	79	75	79	81	78	70	65	69
		Zaragoza	80	80	76	81	82	83	81	67	62	64
		Malaga	77	76	79	82	80	79	77	69	64	70
		Murcia	81	82	90	88	85	79	79	67	68	64
		Palma de Mallorca	64	66	75	75	59	64	64	62	61	59
Spain			75	74	74	74	73	72	73	65	62	61

Source: Own elaboration using 125 CIS barometers from January 2013 to June 2022, except August (N = 398,516).

size of the municipalities and largest cities, as well as by gender, age, and educational attainment. Municipalities with smaller populations generally have a higher proportion of believers than larger cities like Madrid and Barcelona, regardless of demographic characteristics. Among the largest cities, Barcelona stands out as having the lowest proportion of believers, particularly in the 18 to 30 age group where it is 15% lower than Madrid and other municipalities. Therefore, Barcelona can be considered the urban area in Spain with the lowest proportion of believers.

Fig. 2 presents the result of a Multiple Correspondence Analysis as a joint categories graph, which includes the variables of religious identification, population size of the municipalities, gender, age (recoded into four categories), and educational attainment. The graph, shown in a two-dimensional plane, depicts the proximity and distance between the defined categories [18]. The variable for the largest cities variable is not included, as it is derived from two categories of the population size variable. The graph confirms the earlier conclusions and reveals that believers are more proximate to the categories associated with smaller population size, lower educational attainment, older age, and female gender.

In the upper right quadrant, the two major cities, Madrid, and Barcelona, are positioned further away from the category of believers and closer to the category with the highest educational attainment. This phenomenon results from the concentration of university-educated professional (associated with categories 1 (managers) and 2 (professionals) of the ILO ISCO-08, recoded in this work as category 3, *Tertiary, university, in all its dimensions*, in the educational attainment variable) in large cities.

The distance between the category of population size of 400,001 to one million inhabitants and that of believers is slightly lower than to the category of non-believers. The weight of the greater religiosity in Sevilla, Murcia, Zaragoza, and Malaga brings this population group closer to the category of believers, while the lower religiosity in Valencia and specially in Palma de Mallorca moves it away from the believers' category.

Two regression logistic models were defined, both of which included gender, age, educational attainment, and year as common independent variables. Additional independent variables were included in each model; the first model included population size of the municipalities, while the second model included the eight largest cities considered in this study. Both models were found to be statistically significant.

The analysis of the results will be conducted by studying the odds ratios. The proportional change of the odds ratio value will be observed in terms of the quotient of two ratios: one corresponding to the independent variable considered and the other given by the dependent variable, religious identification. The category of believers will be used as the reference. The sign of coefficient B allows us to assume the different variabilities of the ratios of believers, the reference category, for the associated independent variable. A negative value for a certain category implies that it is more likely for them to identify themselves as non-believers than as believers. A positive value, on the other hand, implies that they would most likely identify as believers. The value of exp(B) helps establish the magnitude of these associated probabilities, interpreting its value as a multiplier of the probability of being a believer, the reference category, when coefficient B is positive. If the coefficient B is negative, the multiplier will be the inverse of the value of exp(B).

Table 5 presents the coefficients of the regression logistic model when the municipality size variable is used.

All variables in the model were found statistically significant. The population size of the municipalities, educational attainment and the year variables had negative B coefficient values, while the gender and age variables had positive values. For the first set of variables, it was observed that each time a category was lowered in the size of municipal population or in the educational attainment, religiosity increases by a factor of 1.06 (inverse of 0.946) and 1.60 (inverse of 0.637) respectively. Additionally, religious identification decreases over time by a factor of 1.08 times. On the other hand, it was observed that women were 1.715 times more religious than men, and religiosity increased by a factor of 1.036 times for each year that passes for the interviewees, who were aged between 18 and

Table 4
Religious identification (% of believers) in Spain by population size of the municipalities and largest cities using gender, age and educational attainment as segmentation variables from 2013 to 2022.

				Populationsize(inhabitants)							Largecities							
			Spain	*Less than 2000*	*2001 to 10,000*	*10,001 to 50,000*	*50,001 to 100,000*	*100,001 to 400,000*	*400,001 to one million*	*More than one millime*	*Madrid*	*Barcelona*	*Valencia*	*Sevilla*	*Zaragoza*	*Malaga*	*Murcia*	*Palma de Mallorca*
Variables																		
Educational Attainment	***Gender***	***Age*** *(years)*	70	79	73	69	69	69	71	61	65	54	62	73	75	74	77	63
Compulsory secondary or less	*Man*	*18–30*	57	63	60	56	56	55	60	44	45	43	50	57	69	66	72	43
		31–45	68	74	69	68	67	66	67	53	55	49	51	71	70	69	78	57
		46–65	79	84	81	79	80	76	78	68	71	64	68	79	80	81	91	73
		66–98	87	92	87	87	88	85	87	80	83	76	81	85	91	87	93	87
	Woman	*18–30*	68	73	67	68	69	69	70	57	58	55	51	78	75	73	79	56
		31–45	80	80	82	80	81	78	82	72	75	65	75	82	83	87	94	66
		46–65	89	91	91	87	88	87	90	83	84	80	81	90	91	93	96	87
		66–98	95	98	96	96	95	95	96	92	92	90	93	96	97	98	98	95
Post - compulsory secondary	*Man*	*18–30*	44	57	46	43	43	43	43	38	42	31	33	51	49	45	50	27
		31–45	56	59	59	55	57	56	58	43	49	31	48	62	59	64	70	47
		46–65	65	70	67	66	66	65	67	56	60	50	57	71	65	74	79	68
		66–98	76	75	73	75	78	77	80	74	76	71	77	80	85	78	82	79
	Woman	*18–30*	53	57	55	53	56	51	53	47	53	37	45	58	57	51	67	41
		31–45	70	71	72	70	68	69	73	60	67	48	64	72	76	79	81	62
		46–65	76	77	78	75	77	76	79	69	74	61	73	83	78	84	83	73
		66–98	85	73	71	68	70	71	73	66	85	80	85	90	93	93	91	86
Tertiary, university, in all its dimensions	*Man*	*18–30*	37	41	39	36	38	35	38	34	39	23	34	43	43	33	47	29
		31–45	48	50	49	47	51	48	53	42	49	28	45	57	57	58	58	38
		46–65	59	59	58	57	61	61	63	54	57	48	52	66	73	62	67	56
		66–98	68	69	64	64	66	72	74	66	71	57	70	75	82	75	66	61
	Woman	*18–30*	45	47	47	47	45	43	47	39	45	25	35	56	51	52	45	46
		31–45	57	58	59	58	59	57	60	52	57	38	53	68	65	62	63	43
		46–65	67	66	68	67	68	67	71	61	66	52	60	77	75	74	78	64
		66–98	78	77	79	74	80	81	82	73	76	68	78	83	83	83	81	82

Source: Own elaboration using 125 CIS barometers from January 2013 to June 2022, excepts August (N = 398,516).

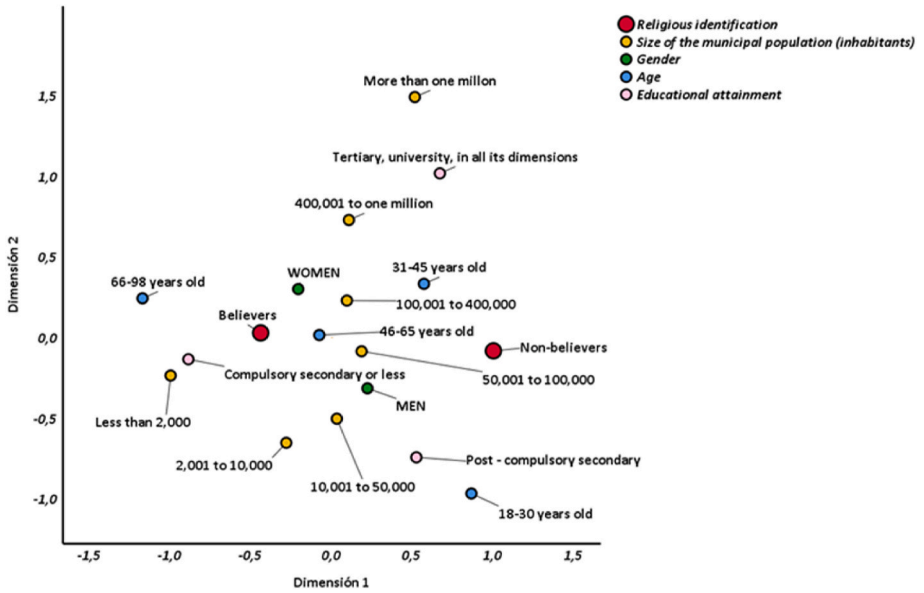

Fig. 2. MCA joint categories plot [49]. 5 variables with a total of 18 categories are included: religious identification (% of believers): 2 categories; population size of the municipalities (7 categories); gender (2categories), age (4 categories), and educational attainment (3 categories) for Spain from January 201 to June2022.
Source: Own elaboration using 125 CIS barometers from January 2013 to June 2022, excepts August (N = 398,516)

Table 5
Regression logistic model. Dependent variable: religious identification (% of believers): Category of reference: **Believers**. Independent Variables: population size of the municipalities (7 categories); gender (2 categories): category of reference: **Women**, age, educational attainment (3 categories) and year for Spain from January 2013 to June 2022.

Variable	B	S.E.	Significance	Exp(B)
Municipality size	−.056	.002	.000	.946
Gender				
Women	.540	.007	.000	1.715
Age	.035	.000	.000	1.036
Educational attainment	−.451	.005	.000	.637
Year	−.079	.001	.000	.924
Intersection	160.616	2.914	.000	5.683E+69

Source: Own elaboration using 125 CIS barometers from January 2013 to June 2022, excepts August(N = 398,516)

98 years.

Table 6 presents the coefficients of logistic regression model when the eight largest cities used in this study were included.

As expected, the values of the coefficient B were found to be the same as in the previous model for the common variables. The inclusion of the eight largest Spanish cities in the model allowed for an analysis of the variability of religious identification based on them. It was observed that the three largest cities, Madrid, Barcelona, and Valencia, together with Palma de Mallorca, had negative values for the B coefficient, indicating a loss of religious identification in these cities. Specifically, in Madrid, the population was 1.17 time more non-believers than the rest of the cities analyzed. This factor is 2.16, 1.42 and 1.34 for Barcelona, Valencia, and Palma de Mallorca, respectively. It was also found that Barcelona had the lowest rate of believers, followed by Valencia, Palma de Mallorca, and Madrid.

On the other hand, the cities of Sevilla, Zaragoza, Malaga, and Murcia had positive coefficient B values, indicating a preponderance of believers in these cities. For example, inhabitants of Sevilla were 1.295 times more religious than the rest of the analyzed population. This factor is 1.284, 1.276 and 1.594 for Zaragoza, Malaga, and Murcia, respectively. These values allowed for the establishment of an order of the religiosity of these cities. Murcia had the highest percentage of believers, followed by Sevilla, Zaragoza, and Malaga.

4. Discussion

The authors found that the percentage of people identifying themselves as believers varies significantly according to the population size of the municipality, with those residing in larger cities (more than 400,000 inhabitants) being less religious than those residing in smaller municipalities (less than 2000 inhabitants). This variability is observed across gender, age, and educational attainment groups.

Table 6
Regression logistic model. Dependent variable: religious identification (% of believers): Category of reference: **Believers**. Independent Variables: largest cities (8 cities); gender (2 categories): category of reference: **Women**, age, educational attainment (3 categories) and year for Spain from January 2013 to June 2022.

Variable	B	S.E.	Significance	Exp(B)
Gender				
Women	.007	.007	.000	1.717
Age	,036	.000	.000	1.036
Educational attainment	−.456	.005	.000	.634
Year	−.080	.001	.000	.923
Madrid	−.160	.015	.000	.852
Barcelona	−.769	.020	.000	.463
Valencia	−.350	.027	.000	.705
Sevilla	.259	.030	.000	1.295
Zaragoza	.250	.031	.000	1.284
Malaga	.243	.034	.000	1.276
Murcia	.466	.041	.000	1.594
Palma de Mallorca	−.289	.041	.000	.749
Intersection	162.436	2.923	.000	3.509E+70

Source: Own elaboration using 125 CIS barometers from January 2013 to June 2022, excepts August(N = 398,516)

The data used in this study comes from the fusion of 125 barometers from Centro de Investigaciones Sociológicas (CIS), a leading sociological research institute in Spain, covering the period between January 2013 and June 2022, except for August. The total sample includes 406,511 respondent who declare themselves as either religious or non-religious, with 398,516 of them providing useable data.

The research indicates that religious identification varies considerably depending on the size of the municipalities, with residents of larger cities being less religious than those in smaller municipalities. Nonetheless, the extent of secularization is more visible in some municipalities than in others, reflecting polarizations of religious identification. The municipalities of Andalusia and Murcia seems to have undergone a slower process of secularization than those of Catalonia, the Balearic Islands, or the Valencian Community, according to respondents from the large municipalities of Sevilla, Malaga, Murcia, Barcelona, Valencia, and Palma de Mallorca, respectively. This suggests a polarization of the secular evolution in Spain, with a similar decline seen more in young people and men, but not with the same starting percentage as those taken in January 2013.

The results indicates that 70% of the people in Spain who identify themselves as religious (mostly Catholic believers, at 97%) did so in the decade of 2013–2022, although this percentage is not distributed equally among between the 8131 municipalities of Spain. The size of the population of the municipalities modifies the central value of 70%, ranging from 61% (cities with more than one million inhabitants, such as 53.9% for the City of Barcelona or 64, 6% in Madrid) to 79% (municipalities with less than 2000 inhabitants). This indicates another indicator of the social change implied by the differentiation between small and large cities. The mobility of population that increases the population of large cities, and at the same time causes aging and depopulation of small municipalities, where nothing has happened, are altering the religiosity in Spain. Large cities seem to extinguish Catholic religious sentiment (58%) and gather a very minority percentage (3% of believer of another religion) with difficulties of social integration, compared to municipalities with less of 2000 inhabitants (78% of Catholics and 1% of believers of other religions) [38]. The proportion of believers in Spanish society seems to be decreasing and is unstoppable ([1,5,50,51]), a trend seen in the societies of the European Union ([9,11,12,19,52]), and in general, in Western countries ([16,34]). The latest available records show that religious marriages in Spain during the year 2021 were 24,607 (16.6%) of the total register for that year (147,827 marriages) [4], much less than those registered in previous years. Another sign of secularization of Spanish society [50].

The results of religious variability by population size of the municipality of residence reveal that there is a range of variability from 61% (or 53.4% of Barcelona) to 79%. Additionally, an increase in the variability is linked to the joint effects of the variables gender, age, and educational attainment, which show a loss of religious identification over the years: Specifically, the percentage of religious identification has decreased from 70% of 2019 to 60% in June of 2021, and it was as high as 80% at the beginning of the 21st century ([43,53]). In summary, throughout these years in Spain, the bivariate records of religious identification versus secularization show women, aged people and those with a lower educational attainment as more believers ([7,8,10,24,31,50,42,54,55]).

The percentage of believers in Spain is less in 2022 that in 2013. This loss of believers in Spain continues to fall over the years and the future of time. According to logistic regression, 7.7% of believers are lost each passing year. In June 2022, only 60% of people in Spain identify themselves as believers. This continued decline in the proportion of believers offers an image of secularity in Spain for the coming years, which in the case of young people between 18 and 30 years of age, becomes more acute and is heading towards an atheist youth Spanish society [50]. Furthermore, this trend is more prominent among men compared to women, with a male/female religiosity ratio of 0.575 (or conversely, 1.718). It is noteworthy that this shift towards atheism persist even among young individuals with tertiary education.

Where people live is statistically significant in religious identification. To the point that 23% of young men aged 18 to 30 with university studies living in Barcelona who identify themselves as believers double in Murcia (45%) and in municipalities with fewer inhabitants (41%). The sizes of the municipalities do not include the great internal variability that occurs in them. Thus, in this same

example, Madrid almost doubles the proportion of young male believers with university studies (39%) than Barcelona, in such a way that the joint religious identification of the municipalities with more than one million inhabitants (Madrid and Barcelona) remains distorted by reflecting an average value of religiosity of 34%, which is actually 23% in Barcelona compared to 39% in Madrid.

The same occurs with municipalities that have more than 400,000 inhabitants and less than one million that offer large interval variation. In the older age groups (over 65 years) the homogeneity between municipalities is much greater. In the logistic regression it has been observed that age reinforces religious identification for each additional year that the person interviewed has (3.6%). A person who is 20 years older than another is twice as likely to identify as religious. Such identification is reduced by 7.7% for each current year considered with respect to the previous one. Thus, it can be seen that secularization is gaining ground in Spanish society as the years go by. The most believers are the oldest, both in large and small municipalities, in large or small cities, but with symptoms also of slight falls in the proportion of believers compared to the pas [22]. indicate that this is a consequence of population turnover in European countries, involving the replacements of cohorts (the contributions of period change and cohort replacement to the general religious decline). Their findings demonstrate that this decline reflects a genuine population dynamic rooted in generational replacement.

5. Conclusion

The findings of this study reveal a statistically significant association between religious identification and the population sizes of municipalities in Spain. Using a database of nearly 400,000 people collected from monthly demographic records of the CIS since January 2013, except August, this study conducted a multidimensional analysis on religious-secular identification in Spain, identifying believers (mainly Catholics) and non-believers as the two groups, which is common in religious research [52]. The study shows that larger municipalities identify themselves less as believers than smaller ones, with Barcelona being a clear example of a more secular city with a young population that has consolidated its lay position over the years. In contrast, the larger municipalities in the South of Spain (Sevilla, Malaga, and Murcia) continue to have a higher rate of religious identification, although with a slight decrease in the last three years.

Significant differences in religiosity are observed among cities of different sizes. Furthermore, within the category or large cities, there are significant differences among them. Madrid, Sevilla, Malaga, and Murcia are found to be markedly different from Barcelona, Valencia and Palma de Mallorca. These significant differences in religiosity among large cities encourage further investigation and conjecture regarding such variation. In this paper, the authors highlight that secularization progresses unevenly across cities and that the overall image of religiosity in Spain (with a religiosity index of 60%) exhibits considerable variability not only across cities of different sizes, but also within large cities, which demonstrate notable distinction among themselves. The study further explores the variability among different groups, including gender, age groups, and level of education. The results shows that women are more religious than men, older people more religious than younger people, and those with less education more religious than those with more education. The results also reveal that the same group profile has more religious people in Murcia. Sevilla, Malaga, and Zaragoza, compared to Madrid, Palma de Mallorca, Valencia, and Barcelona. The exploratory analysis of the multiple correspondence model using a graph of joint categories corroborated the conclusion of the multidimensional descriptive model.

The logistic regressions conducted in this study reveal that the odds of being a believer vary based on the size of the municipalities or the large city. The study suggests that close association of believers with some municipalities and not with others reflects distinct cultures and population profiles that go beyond gender, age, and education. The study recommends further research to delve into the reason why Madrid and Barcelona have such different levels of religious identification, despite having similar group profiles.

This article has examined religious identification in Spanish society based on generic responses to whether respondents declared themselves as religious or non-religious (believers or non-believers), without directly examining religious practices and the actual committed of Spanish individuals as believers. Other potential dimensions, such as the psychological aspect ([56,57]), could be explored to explain the variability in religion identification among the Spanish population. Additionally, introducing other factors such as examining religious practices and the actual committed of Spanish individuals as believers, could also shed light on this variability. These aspects could be the subject of future research, with a focus on individuals who identify as religious and also declares regular participation in religious activities.

In conclusion, this study confirms the relationship between religious identification and the population sizes of municipalities in Spain, providing a quantitative measure of religious identification and facilitating comparison made between cities. These findings suggest that religious identification is influenced by cultural and population profiles, with significant variations among different groups. Future research is needed to explore the reasons behind these variations.

These results have important implications for policymakers and religious organization. The information gained from this study can be used to better understand and address the needs of different religious communities in their jurisdiction, as well as to target their outreach efforts and gain a better understanding of the demographic factors that influence religious affiliation.

Declarations

Author contribution statement

All authors listed have significantly contributed to the development and the writing of this article.

5.1. Data availability statement

All information used in this work has been obtained from the barometres carried out by the Sociological Research Center (CIS) of Spain and is freely available on its website https://www.cis.es/cis/opencm/ES/11_barometers/index.jsp as has also been indicated in the work itself.

Additional information

No additional information is available for this paper.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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