MACROSTATISTICS PRESENTATION

BULGARIA AND SPAIN

NUTS 3 LEVEL

Realised by

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INTRODUCTION: TOPIC SELECTION

We have decided to analyze data from **the year 2022,** sourced from reliable platforms such as Eurostat, focusing on two countries at the NUTS 3 level: **Bulgaria and Spain**.

These countries were selected to represent **contrasting regions of Europe**, allowing for a meaningful comparison.

Understanding regional differences in demographics and macroeconomic indicators provides valuable insights into **the social and economic dynamics** across Europe.

We choose variables like deaths, fertility indicators, population size, and live births. These variables are critical for assessing the future labor force, dependency ratios, and economic sustainability, which differ significantly between the two countries.

VARIABLES SELECTION

These variables are critical for assessing the future labor force, dependency ratios, and economic sustainability, which differ significantly between the two countries.

1.DEATHS

= the permanent disappearance of all evidence of life at any time after live birth has taken place

2.LIVE BIRTHS

=complete expulsion from its mother of a result of conception, irrespective of the duration of pregnancy, which after such separation, breathes or shows any other evidence of life, whether or not the umbilical cord has been cut or the placenta is attache

3.POPULATION SIZE

=those who have lived in their place of usual residence for a continuous period of at least 12 months before the reference time; or those who arrived in their place of usual residence during the 12 months before the reference time with the intention of staying there for at least one year.

4.FERTILITY INDICATORS

=mean number of children that would be born alive to a woman during her lifetime if she were to pass through her childbearing years.

METADATA

Relevance : Statistics on population change and on population structure are increasingly used to support policy-making and to monitor demographic behaviour within political, economic, social and cultural contexts.

The NUTS classification is a hierarchical system for dividing up the economic territory of the EU for the purpose of:

- collecting, developing and harmonising of European regional statistics;
- socio-economic analyses of the NUTS regions at various levels:
- NUTS 3 level - smaller regions for specific diagnoses
- framing of EU regional policies.

Unit of measure: Population, live births and deaths are expressed in absolute values.

Source: Data are provided by the National Statistical Institutes

Time Frame: Data for the year 2022.

SELECTION OF THE DATA

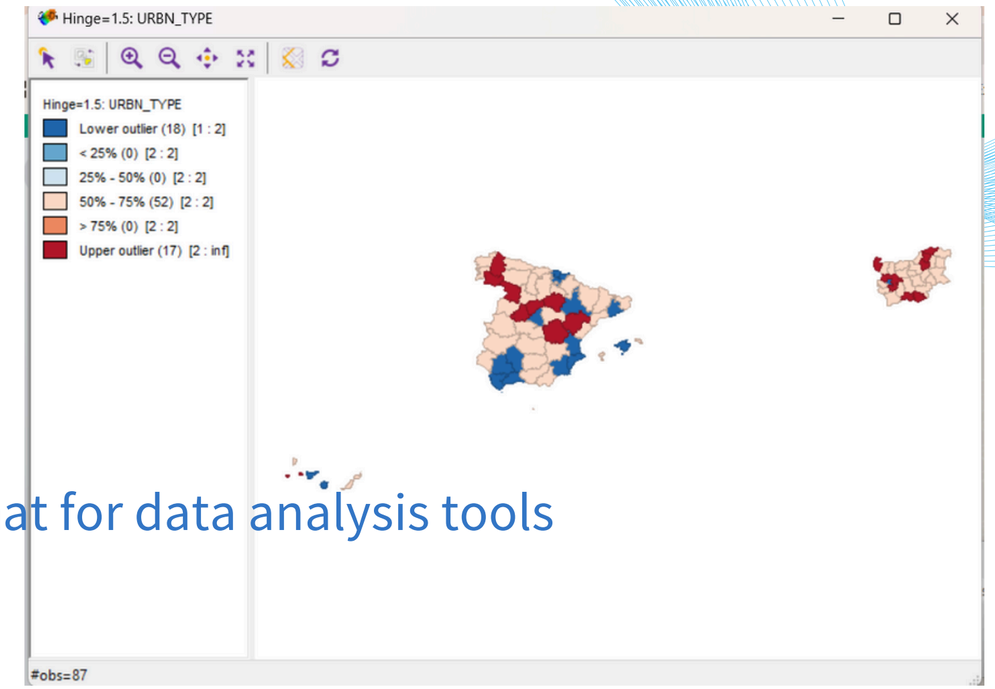
STEP 1 SELECTING THE GEOGRAPHIC SCOPE

STEP 2: IDENTIFYING RELEVANT VARIABLES

STEP 3: EXTRACTING AND COMPILING DATA

The Excel file was saved in CSV format, a widely accepted format for data analysis tools

STEP 4: CREATING A CONSOLIDATED EXCEL TABLE



STEP 5: CONVERTING TO CSV FORMAT

STEP 6: IMPORTING DATA INTO GEODA

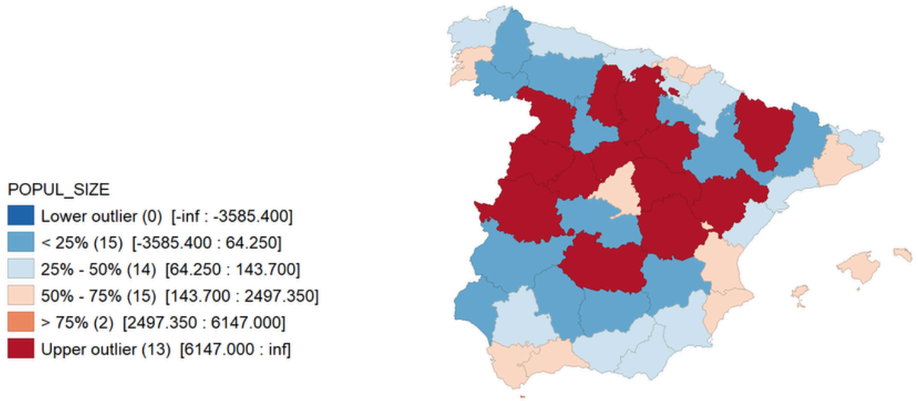
The CSV file was connected to GeoDa, a geospatial analysis tool:

The data was imported to create spatial layers.

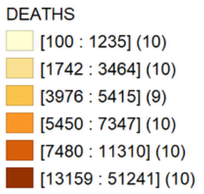
SPATIAL REPRESENTATION OF THE VARIABLES

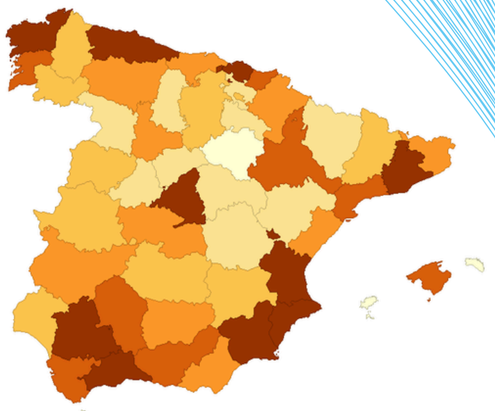
We opened the map of all the countries, we merged the variables from the maps.

For each variable we created Quartile Map, Percentile Map, Box 1.5, Box 1.3 and Standard Deviation Map.

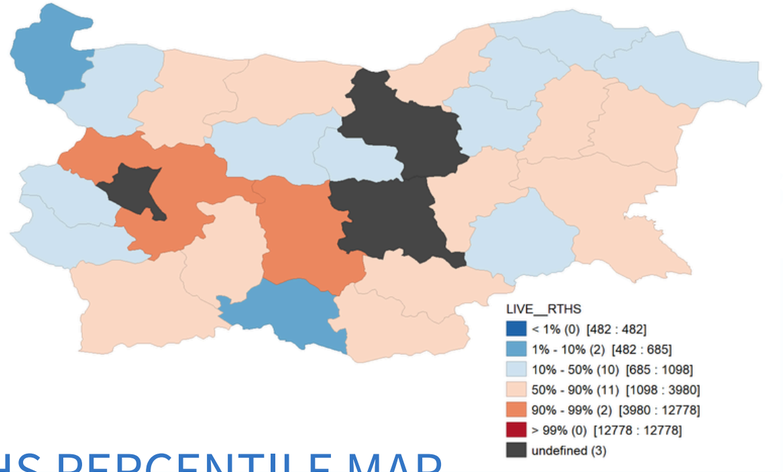


SPAIN POPULATION SIZE BOX 1.5



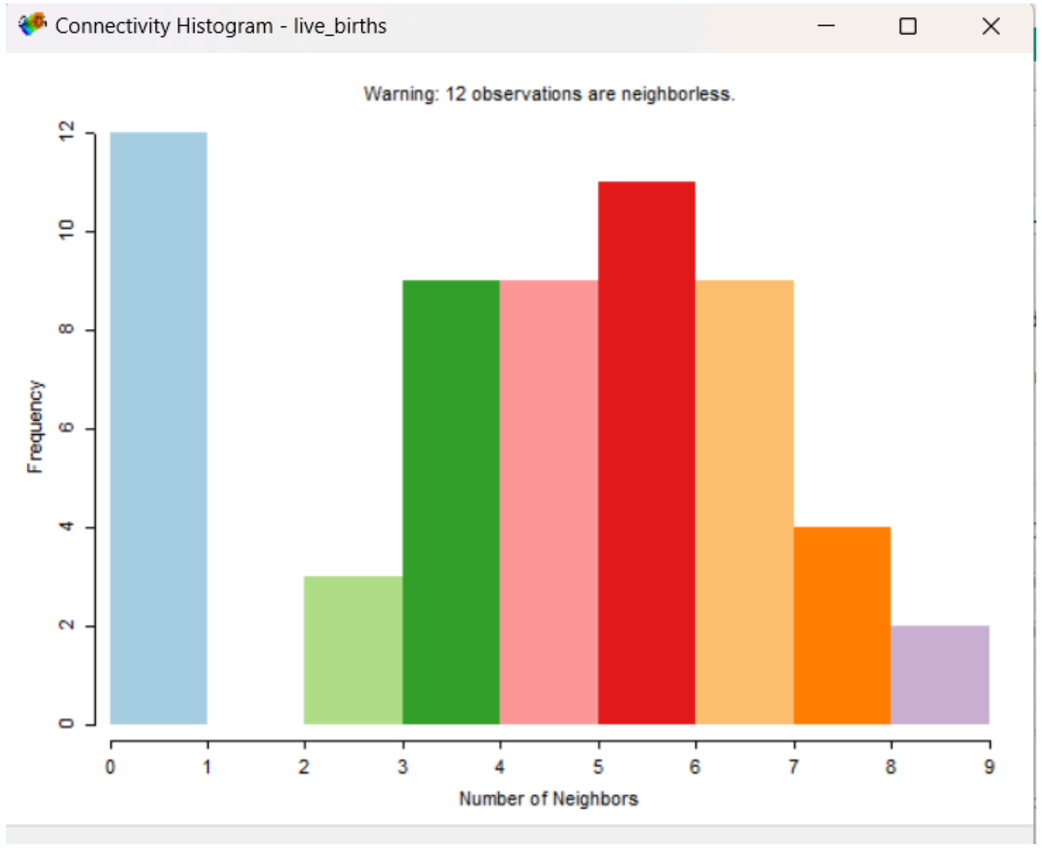


SPAIN DEATHS QUARTILE MAP



BULGARIA LIVE BIRTHS PERCENTILE MAP

SPATIAL RELATIONSHIPS



QUEEN CONTIGNUITY

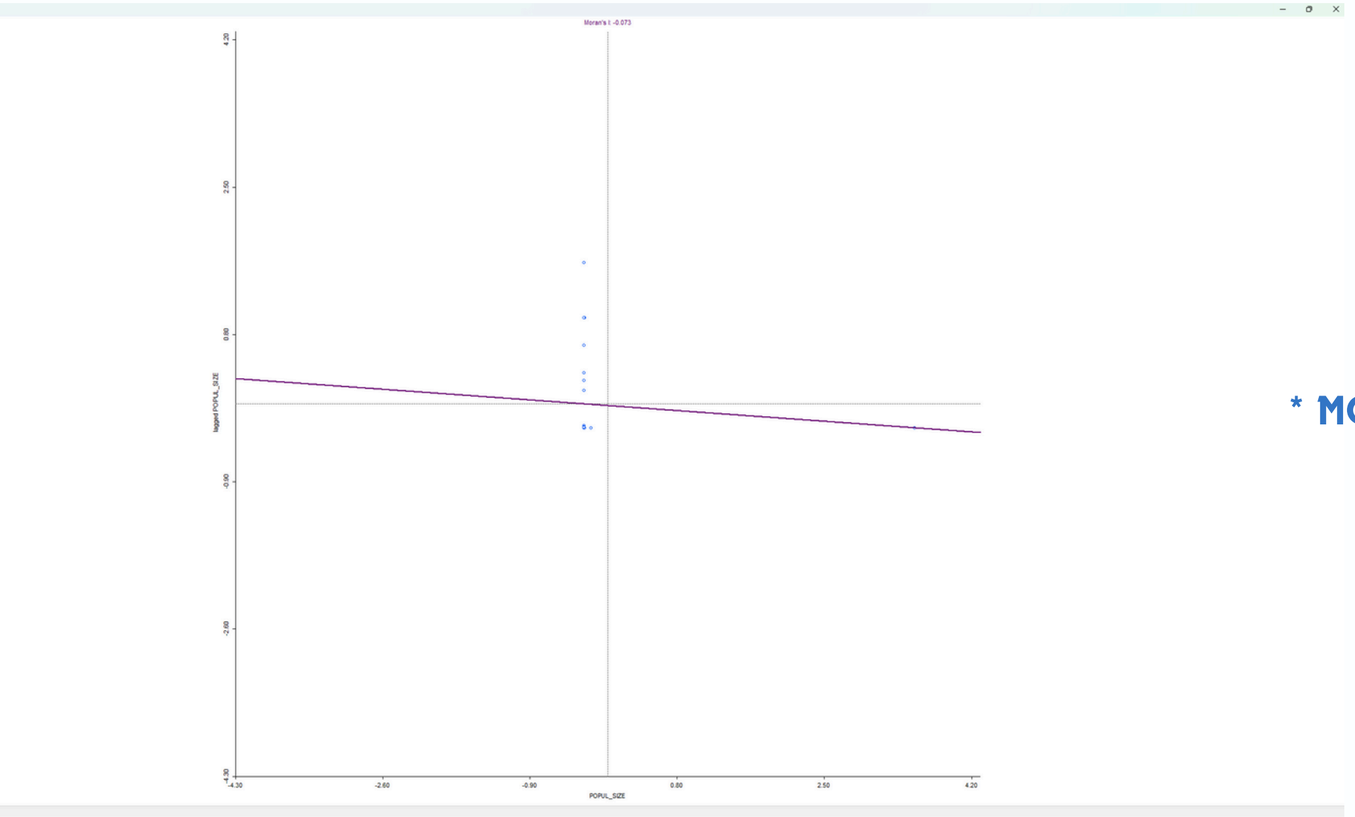
HISTOGRAM FOR LIVE BIRTHS SPAIN

Property	Value
type	rook
symmetry	symmetric
file	live_births spain.gal
id variable	LIVE__RTHS
order	1

ROOK CONTIGNUITY:

HISTOGRAM FOR LIVE BIRTHS SPAIN

LOCAL MORANS I UNIVARIATE



POPULATION SIZE BULGARIA

* 3 SIGNIFICANT REGIONS (HIGHLIGHTED IN GREEN):
* LIGHT GREEN (P ≤ 0.05): 2 REGIONS.
* MEDIUM GREEN (P ≤ 0.01): 1 REGION.
* DARK GREEN (P ≤ 0.001): 0 REGIONS.
* MOST REGIONS (25) ARE NOT STATISTICALLY SIGNIFICANT (WHITE).

SPAIN:

* 6 SIGNIFICANT REGIONS (HIGHLIGHTED IN GREEN):
* LIGHT GREEN (P ≤ 0.05): 4 REGIONS.
* MEDIUM GREEN (P ≤ 0.01): 1 REGION.
* DARK GREEN (P ≤ 0.001): 1 REGION.

* The majority of the points suggest weak negative correlation, where regions with high population sizes are surrounded by regions with low population size and vice versa. Only a few regions with low population size also have low neighboring population sizes.

LOCAL MORANS I BIVARIATE

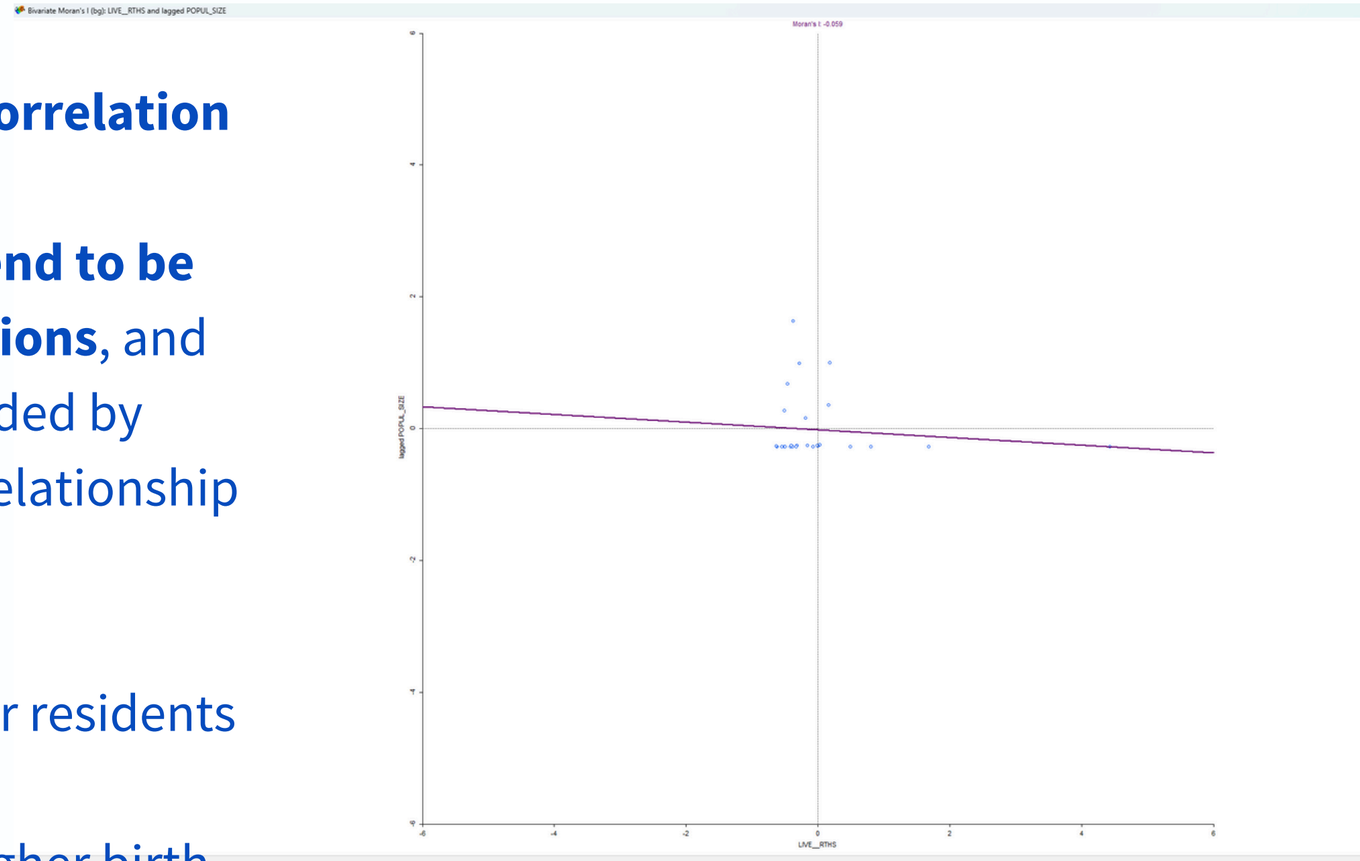
Moran’s I Value: -0.059

This value indicates **weak negative spatial autocorrelation** between live births and population size.

In spatial terms, **regions with high live births tend to be surrounded by neighbors with smaller populations**, and regions with low live births tend to be surrounded by neighbors with larger populations. However, this relationship is not strong.

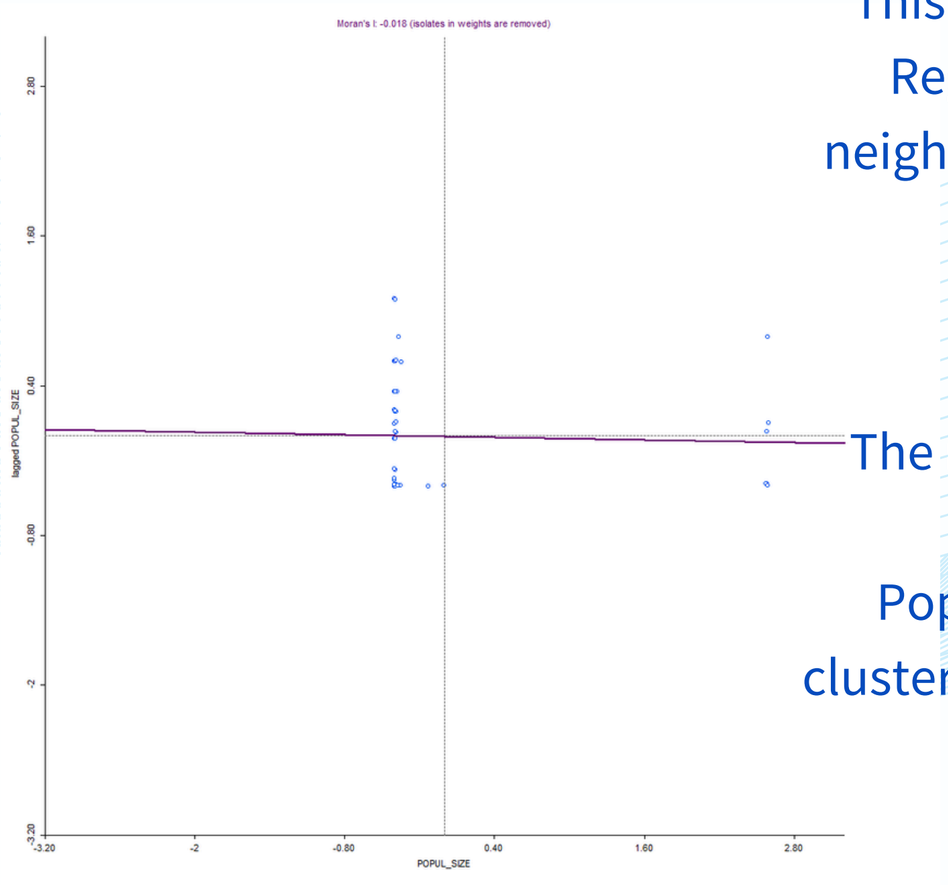
Low-Low Clusters: Represent rural areas with fewer residents and lower birth rates.

High-Low Outliers: Suggest urban centers with higher birth rates surrounded by sparsely populated areas



LIVE BIRTHS AND POPULATION SIZE BULGARIA

GLOBAL MORANS 1 UNIVARIATE



POPULATION SIZE IN SPAIN

Moran’s I Value: -0.018

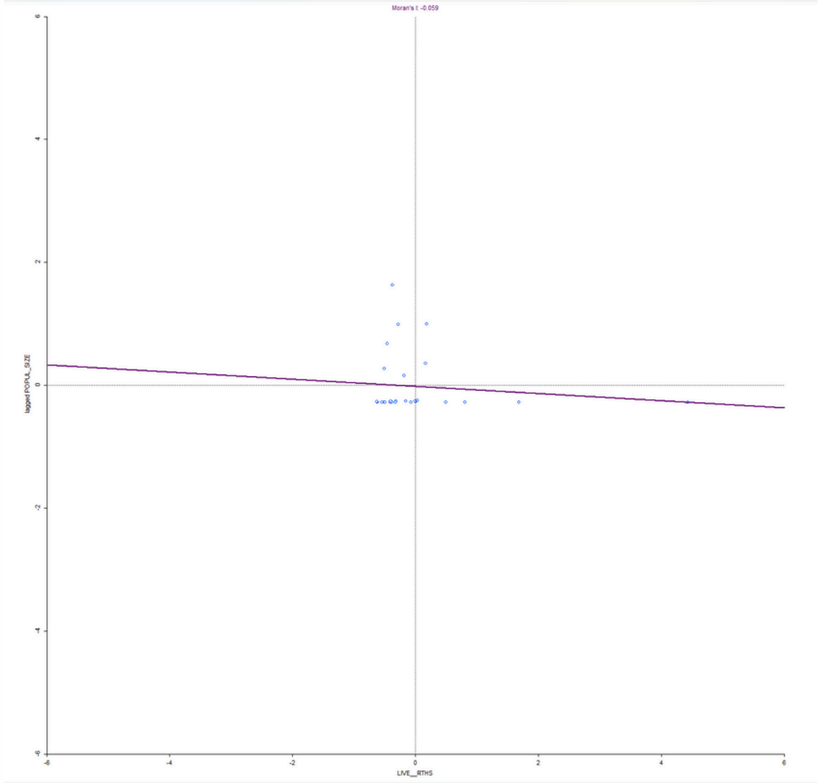
This value indicates a very slight negative spatial autocorrelation. Regions with high population sizes are weakly associated with neighbors having low population sizes, and vice versa. However, the strength of this relationship is negligible.

Weak Spatial Autocorrelation:

The nearly zero Moran's I suggests that population size in Spanish regions does not exhibit a strong spatial pattern.

Population size appears to be randomly distributed rather than clustering spatially (e.g., high-population regions surrounded by high-population neighbors).

GLOBAL MORANS 1 BIVARIATE



MORAN'S I VALUE: -0.059
THIS INDICATES A WEAK NEGATIVE SPATIAL AUTOCORRELATION BETWEEN LIVE BIRTHS AND POPULATION SIZE.
REGIONS WITH HIGH LIVE BIRTH RATES ARE WEAKLY ASSOCIATED WITH NEIGHBORS THAT HAVE SMALLER POPULATIONS, AND REGIONS WITH LOW LIVE BIRTH RATES ARE WEAKLY ASSOCIATED WITH NEIGHBORS THAT HAVE LARGER POPULATIONS. HOWEVER, THE STRENGTH OF THIS RELATIONSHIP IS MINIMAL.

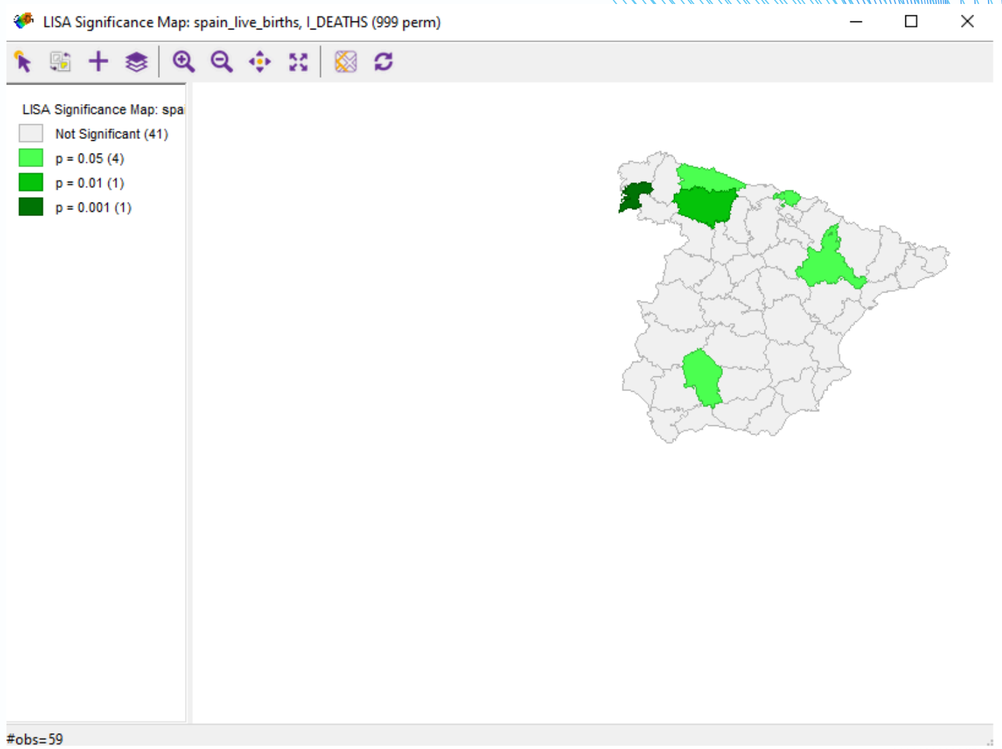
THE VALUE SUGGESTS NO STRONG OR SYSTEMATIC SPATIAL RELATIONSHIP BETWEEN LIVE BIRTHS AND POPULATION SIZE.
THE NEGATIVE VALUE INDICATES A SLIGHT TENDENCY FOR REGIONS WITH HIGH LIVE BIRTHS TO BE SURROUNDED BY REGIONS WITH SMALLER POPULATIONS, AND VICE VERSA.

SPATIAL SPILLOVER

Spillover Effects:

Significant regions in northern Spain suggest spatial spillovers, where neighboring areas influence each other.

Example: High live births in one region might positively affect adjacent areas, possibly due to shared healthcare resources or cultural similarities.Regions in central Spain exhibit clustering, which could indicate localized demographic policies or economic factors driving fertility.



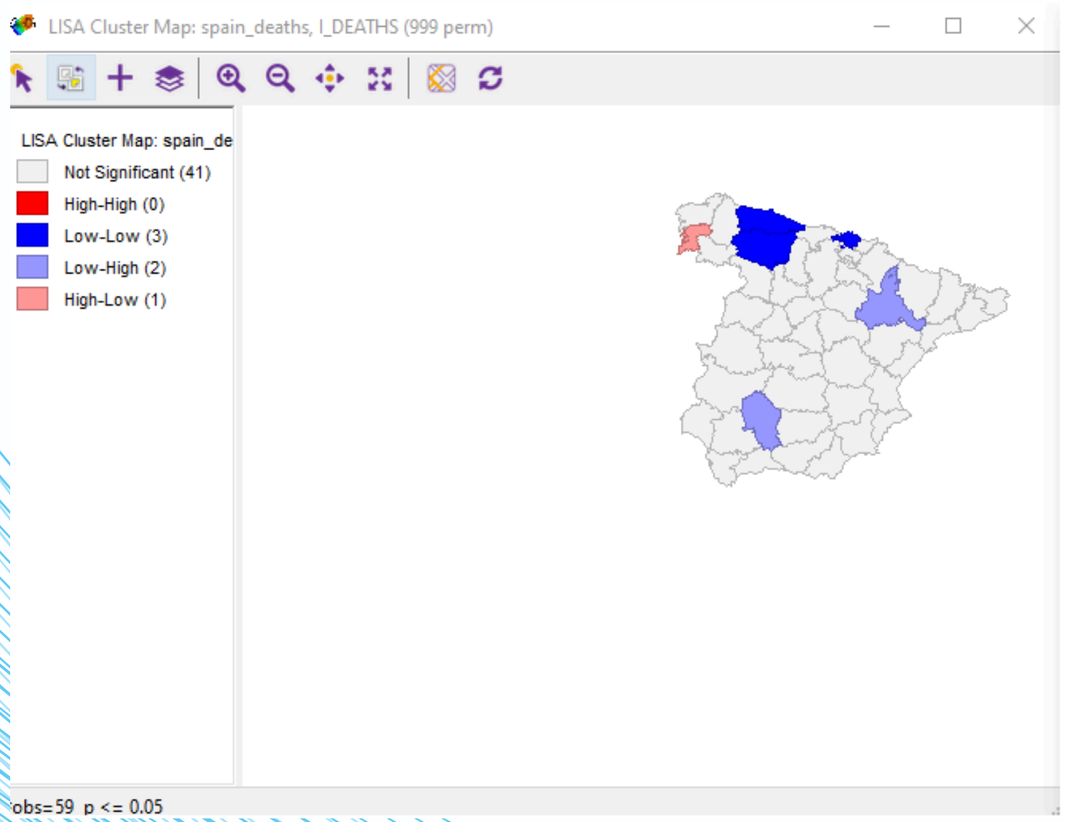
LIVE BIRTHS SPAIN

Regional Disparities in Birth Rates:

Significant regions (dark and medium green) contrast sharply with the majority of non-significant areas, highlighting uneven distribution of live births.

This could reflect differences in fertility preferences, healthcare access, or economic conditions.

CLUSTER MAP



SPAIN, DEAHTS

LOW-LOW CLUSTERS:

Regions: These regions are spatially clustered with both themselves and their neighbors exhibiting low death rates.

HIGH-LOW OUTLIERS :

Region: Located in the northwestern part of Spain.

This outlier suggests that a region with high death rates is surrounded by neighbors with low death rates.

LOW-HIGH OUTLIERS:

Regions: Found in central Spain.

Implications:

These regions have low death rates but are surrounded by neighbors with high death rates.

SIGNIFICANCE MAP

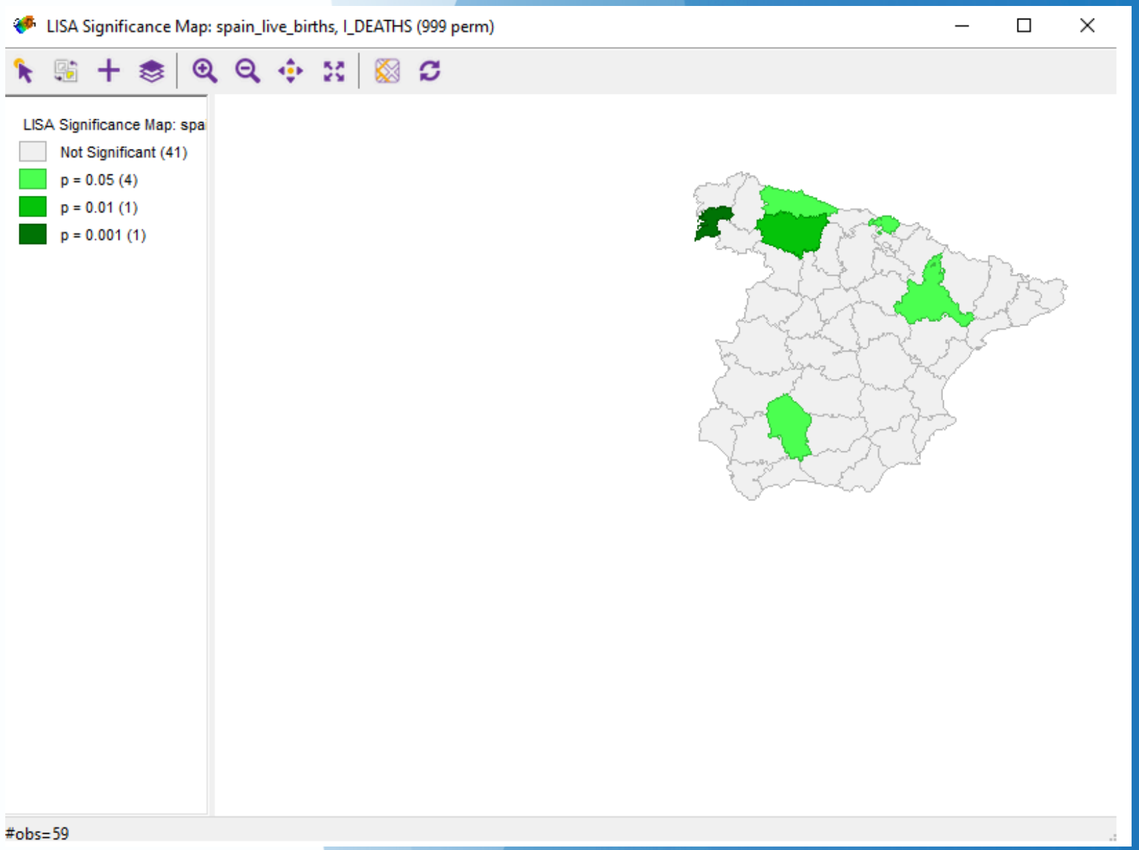
COLOR LEGEND AND INTERPRETATION:

DARK GREEN (P ≤ 0.001): 1 REGION WITH EXTREMELY SIGNIFICANT LOCAL SPATIAL AUTOCORRELATION.

MEDIUM GREEN (P ≤ 0.01): 1 REGION WITH HIGHLY SIGNIFICANT LOCAL SPATIAL AUTOCORRELATION.

LIGHT GREEN (P ≤ 0.05): 4 REGIONS WITH SIGNIFICANT LOCAL SPATIAL AUTOCORRELATION.

WHITE (NOT SIGNIFICANT): 41 REGIONS WHERE SPATIAL PATTERNS ARE NOT STATISTICALLY SIGNIFICANT.



LIVE BIRTHS SPAIN

1**. Highly Significant Clusters (Dark Green, Medium Green)**

These regions exhibit strong spatial clustering of live births:

- Likely reflect areas with consistently high or low birth rates compared to neighboring regions.
- Northern Spain shows distinct clusters, potentially due to demographic factors (e.g., urbanization, economic stability, or cultural factors favoring family planning).
-

2. **Moderately Significant Clusters (Light Green)**

These regions show weaker but still notable spatial autocorrelation.

Central regions with significant clustering might indicate localized effects of healthcare or socio-economic factors.

3. **Non-Significant Areas (White)**

The majority of Spain’s regions do not exhibit statistically significant local spatial autocorrelation:

- This indicates random spatial distribution of live births in these areas.
- Reflects either diverse regional fertility trends or lack of spatially structured demographic behaviors.

THANK YOU !