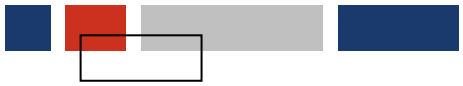
INSTITUTO NACIONAL DE ESTATÍSTICA
STATISTICS PORTUGAL

Using census data to assist in sampling of survey on ethnic discrimination

Afshin Ashofteh
Joao Lopes
Pedro Campos

DMSI / ME



Junho 2024

Aim

» Assist in survey on ethnic discrimination

- Survey on Living Conditions, Origins and Trajectories of Population Resident in Portugal (ICOT);
- Typical challenge on representativity of minority groups;
- Sampling scheme accounting for selected groups of parishes.

» Create groups of parishes with target population

- Use socio-demographic data from population census;
- Group the 3092 parishes of Portugal;
- Select for marginal population and ethnic minorities.

Introduction > procedure

» Procedure

1. Collect socio-demographic data from population census;
2. Collect geospatial data of parishes;
3. Create hierarchical cluster tree;
4. Characterize clusters of parishes;
5. Create geospatial maps of clusters;
6. Select important clusters of parishes.

» Software

- Use R (main packages “ROracle”, “NbClust”, “dendextend”, “sf”).

Data > data source

» 37 variables from ‘Censos 21’ (Statistics Portugal)

- Sex-ratio (2 categories);
- Literacy (1 category);
- Education (11 categories);
- Place-of-birth (12 categories);
- Religion (11 categories);

[at individual-level]

» Geospatial data from http://dados.gov.pt

- Shapefiles of Portuguese parishes (“Freguesias”).

Data > data merging

» Create final dataset

- Percentages for each category of variables [at parish-level];
- Selection of categories (25) potentially related to discrimination;
- Merge geographical information.

ID	Female	illiterate	Nenhum		BRA	…	Orthodox	…
10103	52%	7%	7%	…	2%	…	1%	…
10109	52%	5%	6%	…	1%	…	1%	…
10112	51%	6%	7%	…	1%	…	0%	…
10119	51%	7%	6%	…	1%	…	0%	…
10121	52%	7%	7%	…	4%	…	1%	…
…	…	…	…	…	…	…	…	…

Methods > HCA

» Hierarchical cluster tree

- Euclidean distance;
- Ward's minimum variance.

» Optimal number of clusters

- Minimization criteria (McClain, SD index);
- 'Index > 1' criteria (Frey);
- Maximization criteria (Point biserial, Silhouette);

[Flexible approach depending on branch of tree]

Methods > Significance

» Set significance thresholds for each category

- 3 negative levels ($< P_{10}$, '-'; $< P_{05}$, '- -'; $< P_{01}$, '- - -');
- 3 positive levels ($> P_{90}$, '+'; $< P_{95}$, '++'; $< P_{99}$, '+++').

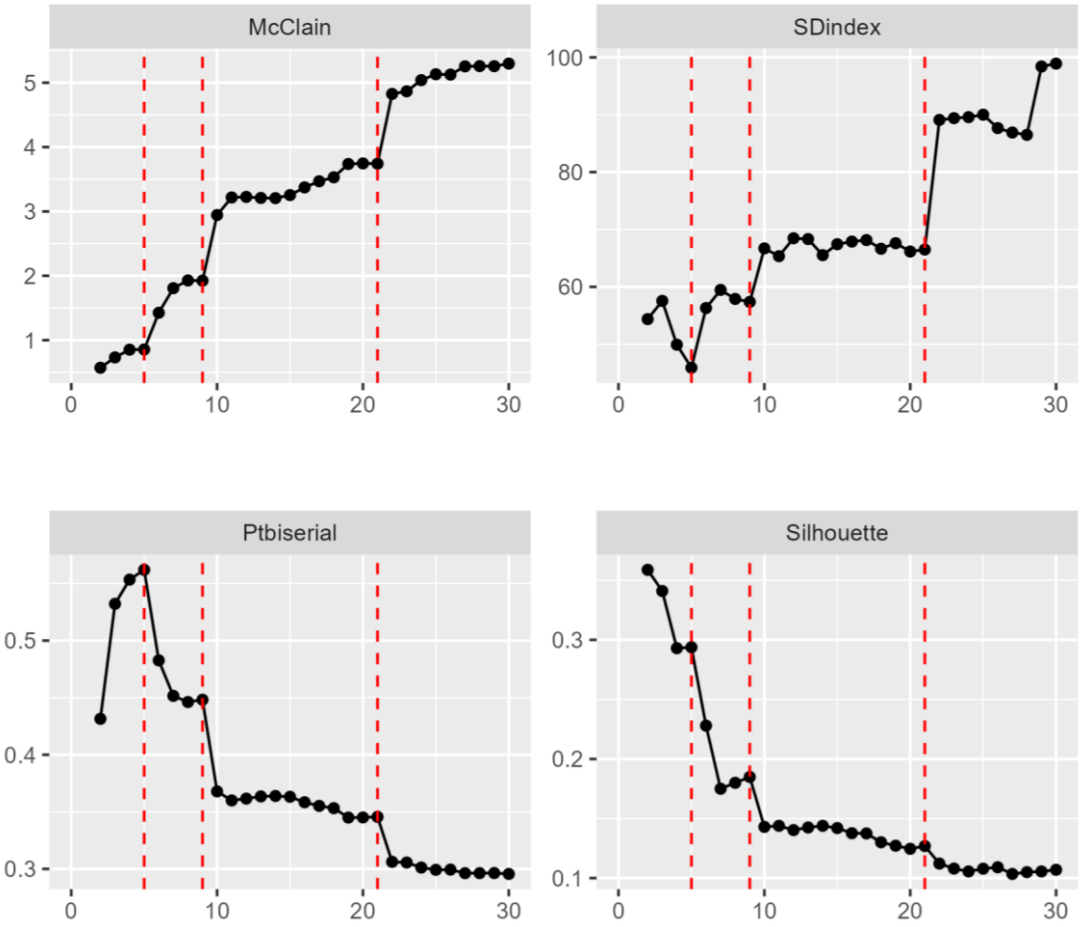
» Assess significance of clusters for each category

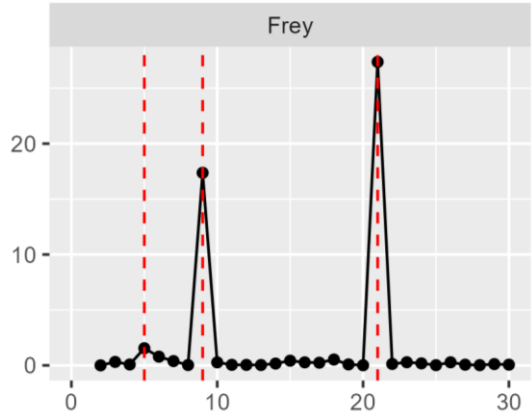
- Average value within parishes from each cluster.

» Select important clusters

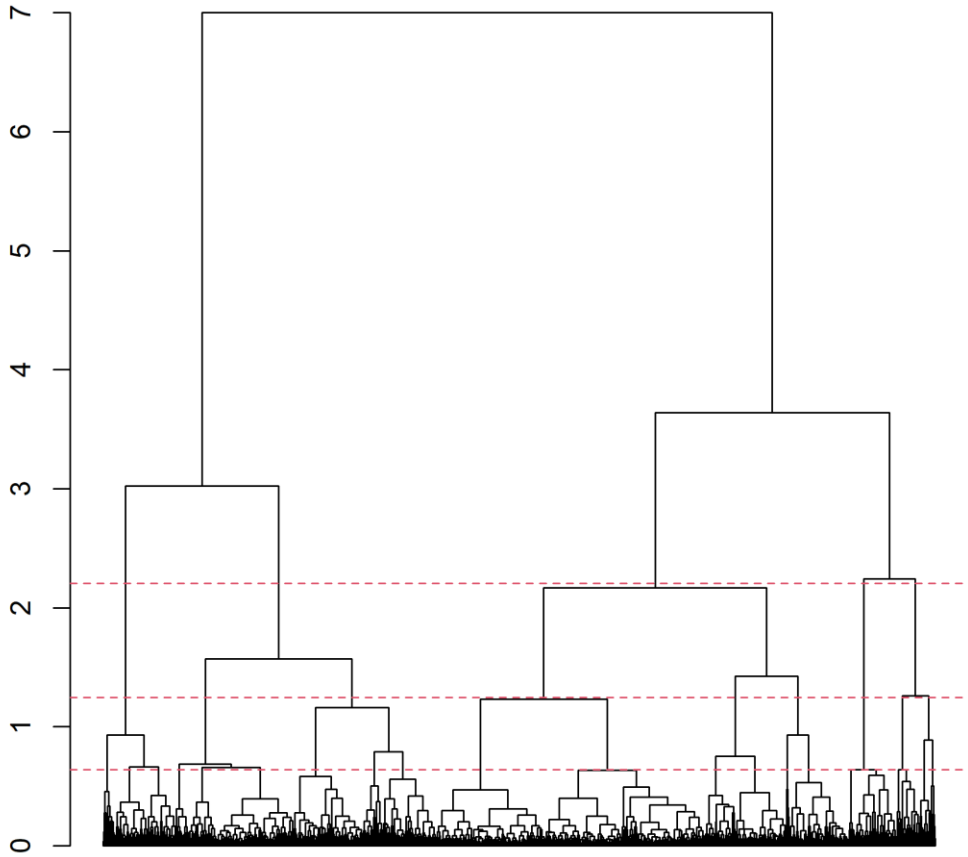
- Significance of each category;
- Geospatial location of parishes.

Results > HCA





Results > HCA



- 5 clusters
- 9 clusters
- 21 clusters

Results > Significance

» Characterization of 6 selected clusters (A to F)

Variable	A	B	C	D	E	F
n	270	11	26	153	18	16

Variable	A	B	C	D	E	F
Female		- - -				-

Variable	A	B	C	D	E	F
Illiterate						

Variable	A	B	C	D	E	F
“Nenhum”						
“Básico 1”	++		-	- -		

Results > Significance

» Characterization of 6 selected clusters (A to F)

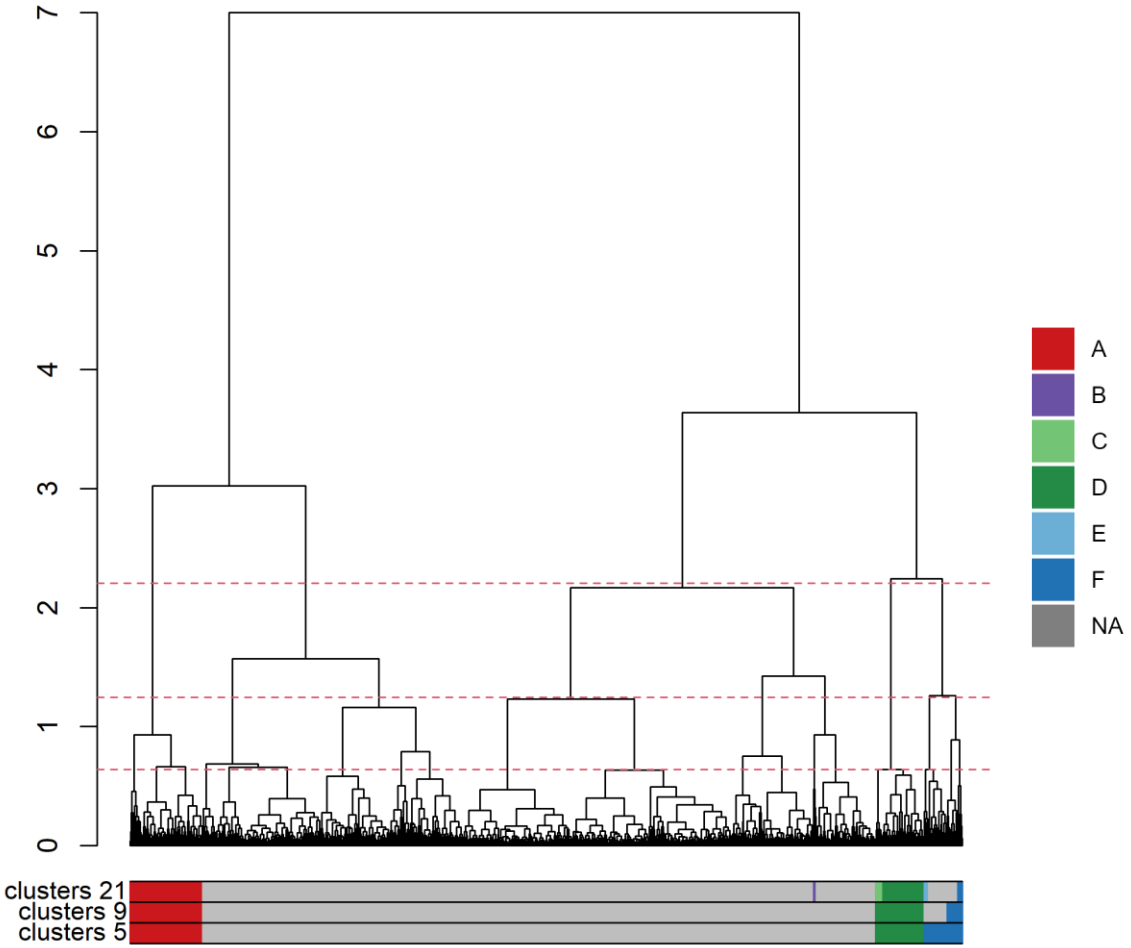
Variable	A	B	C	D	E	F
BR			+	++		
PALOP			+	++		
E27 + GB			++		+++	+++
VE	- -					
East-Eur	- -	++	++			
CH						
South-Asia	-	+++				
CN	- - -				- - -	
ZA	- -				+	
North-Amer						
Other		+++	+			++

Results > Significance

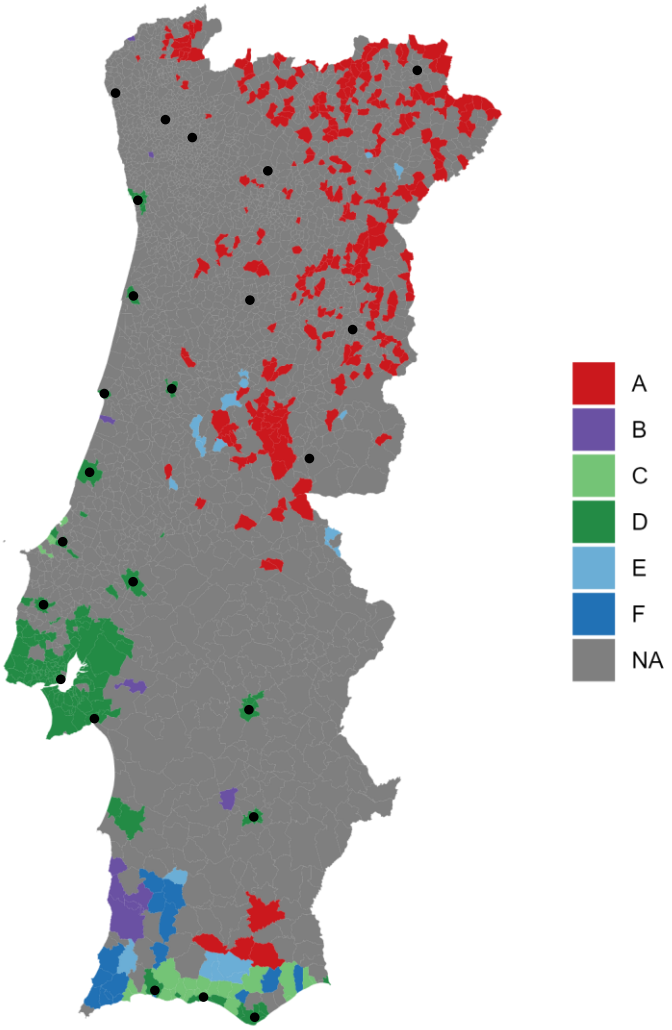
» Characterization of 6 selected clusters (A to F)

Variable	A	B	C	D	E	F
Orthodox	- -	++	++			+
Protestant			++	+		++
Jehovah's						
Other Christ.			++	+	+	++
Buddhist	- -	+++				+
Hindu	- - -	+++				
Jewish						+
Muslin	- -	+++		+		
Other	- -	+++				++
No religion			+	++		+++

Results > Final

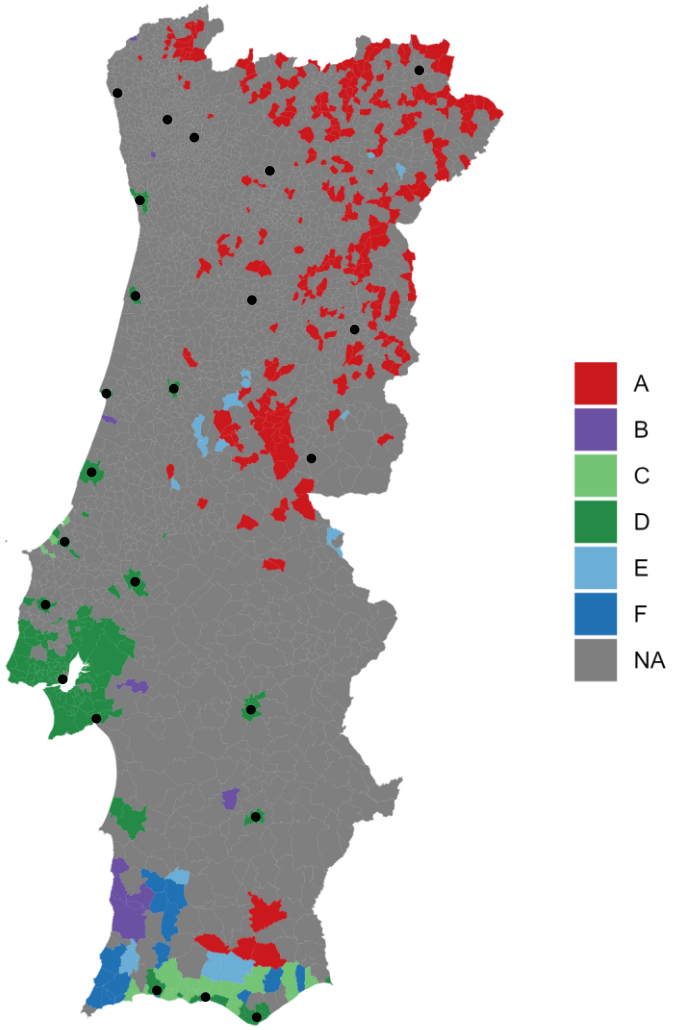


Results > Final



	Description
A	Low-education Portuguese
B	Southern-Asian in Primary Sector
C	High-class Touristic Areas
D	Afrodescendents in Urban Areas
E	Emigration-related Europeans
F	Europeans in Rural Areas

Recommendation



» Oversampling priority:

- B and D (164 in 3092);
- **B, D and F (180 in 3092)**;
- B, C, D and F (206 in 3092);
- B, C, D, E and F (224 in 3092);
- A, B, C, D, E and F (494 in 3092).

Take home

- Devised strategy to use **population census data** to assist in efficient targeting of **marginal population** and **ethnic minorities**;
- Considered **3092 parishes** using **25 socio-demographic variables**;
- Used **hierarchical clustering** and **geospatial** analysis;
- Selected 6 potentially important clusters (**494 parishes**);
- Recommend prioritize the use of 3 clusters (**180 parishes**).

INSTITUTO NACIONAL DE ESTATÍSTICA
STATISTICS PORTUGAL

Thank You

Bibliography

Illiteracy and Racism:
Cavaco, 2018, Revista Internacional de Educação de Jovens e Adultos.
Santos, 2019, Boletim Estatístico (Observatório das Migrações).

Municipal Plans for Immigration Integration and Immigrants in Primary Sector:
Pires, 2016, Revista Migrações - Planos de Integração para Migrantes.
Carvalho, 2021, Revista Migrações.
Agostinho, 2022, Master thesis (Universidade Nova de Lisboa).

Migration from EU- countries:
Santos & Godinho, 2018, Boletim Estatístico (Observatório das Migrações).
Oliveira, 2023, Relatório Estatístico Anual (Observatório das Migrações).

Racism towards Afrodescendants:
Santos, 2019, Revista Migrações - Afrodescendentes em Portugal.

Historical Emigration:
Oliveira & Nunes, 2017, Estudos (Statistics Portugal).

Motivation

» European Union (EU)

- "A Union of Equality: EU Anti-Racism Action Plan 2020–2025";
- Assess impact of discrimination by collecting racial and ethnic data.

» Portugal

- "National Plan to Combat Racism and Discrimination 2021-2025";
- Parliamentary Resolution no. 11/2021 and 16/2021;
- Combat racism and ethnic discrimination in Portugal.

Methods > explore data

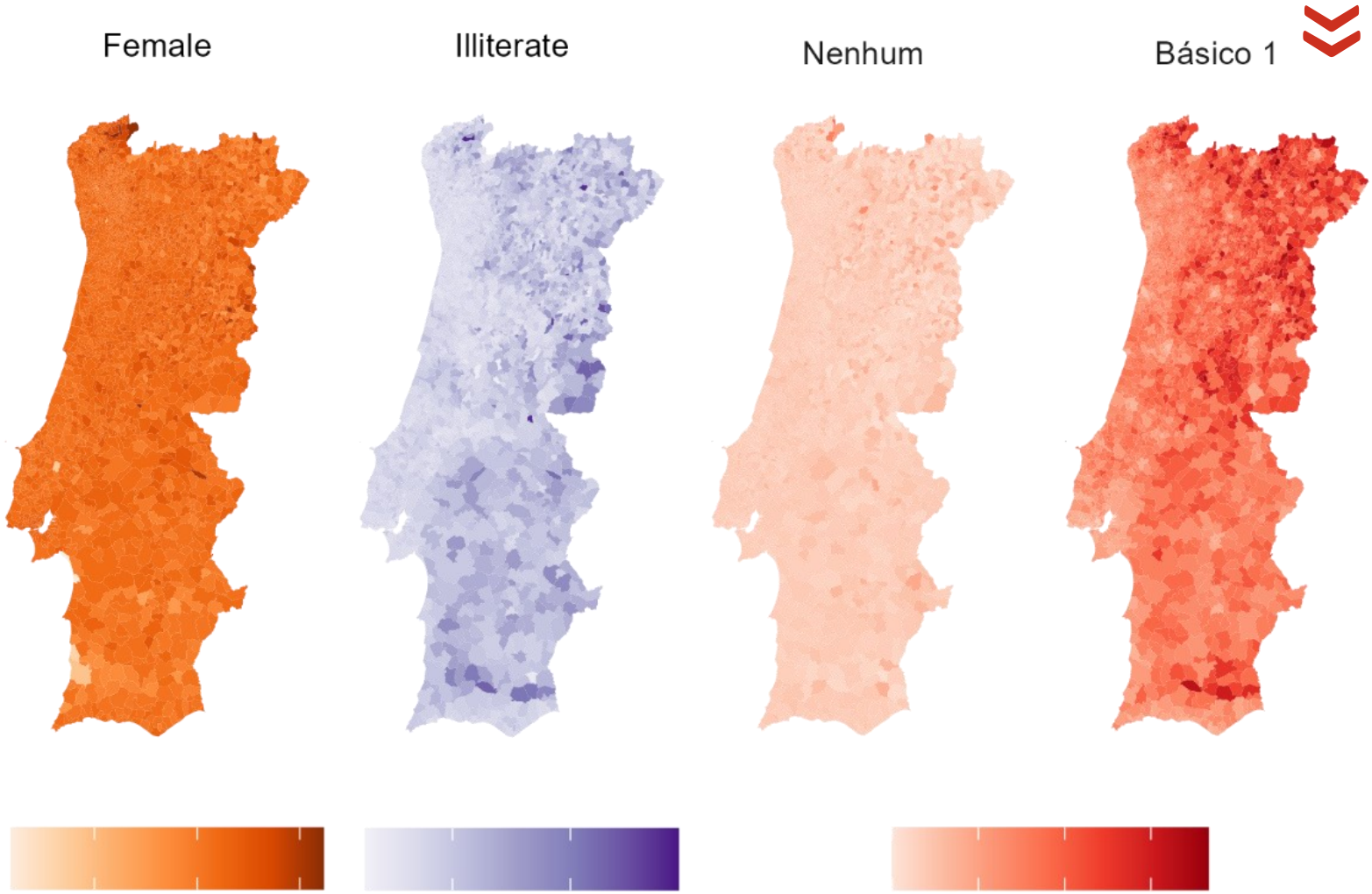
» Main variables [at parish-level]

- Sex-ratio (1 categories);
- Literacy (1 category);
- Education (2 categories);
- Place-of-birth (11 categories);
- Religion (10 categories)

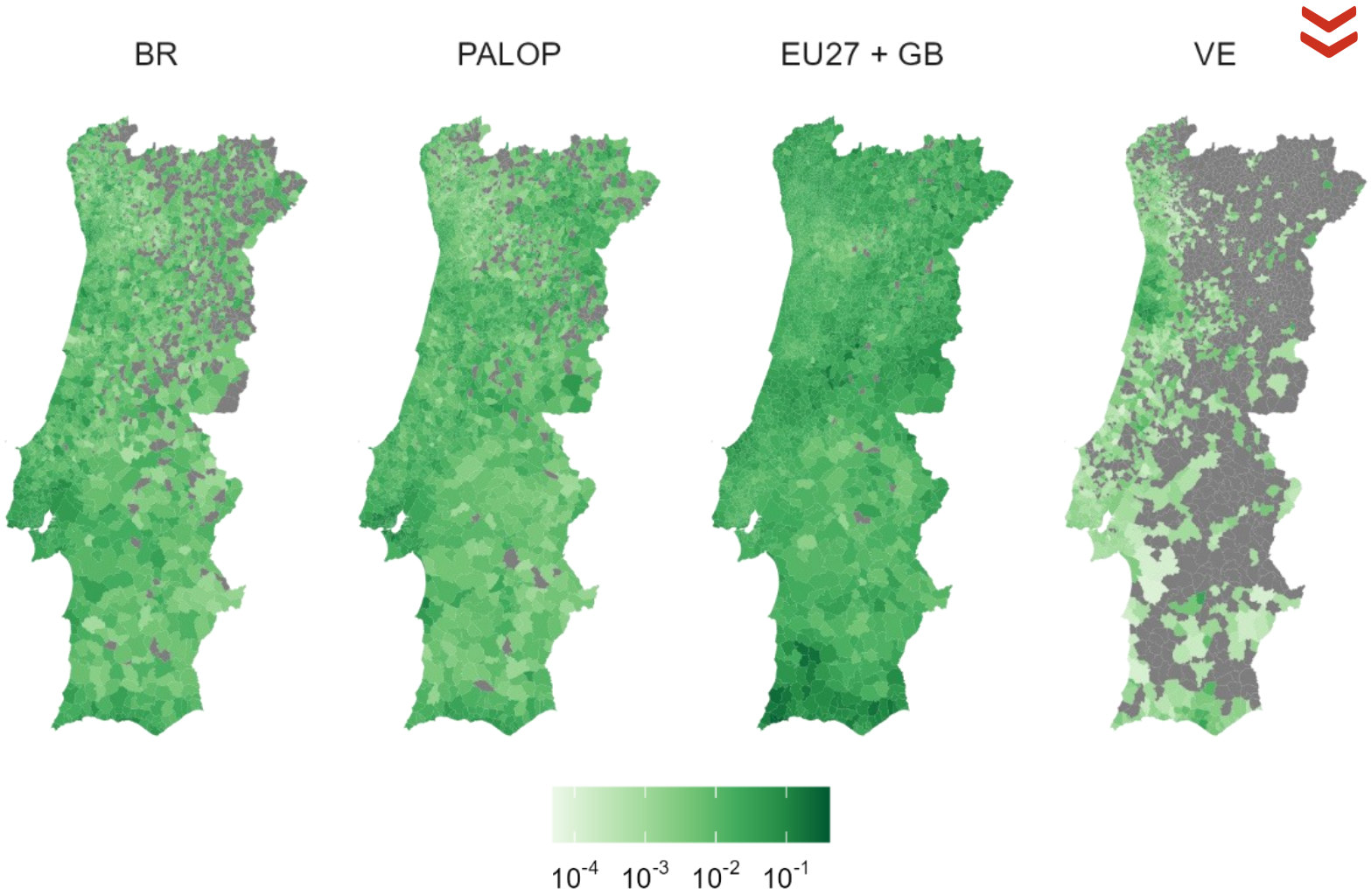
» Methods

- Calculate summary statistics: n, $\hat{m}$, sd, P_{50}, P_{25}, P_{75};
- Create geospatial maps.

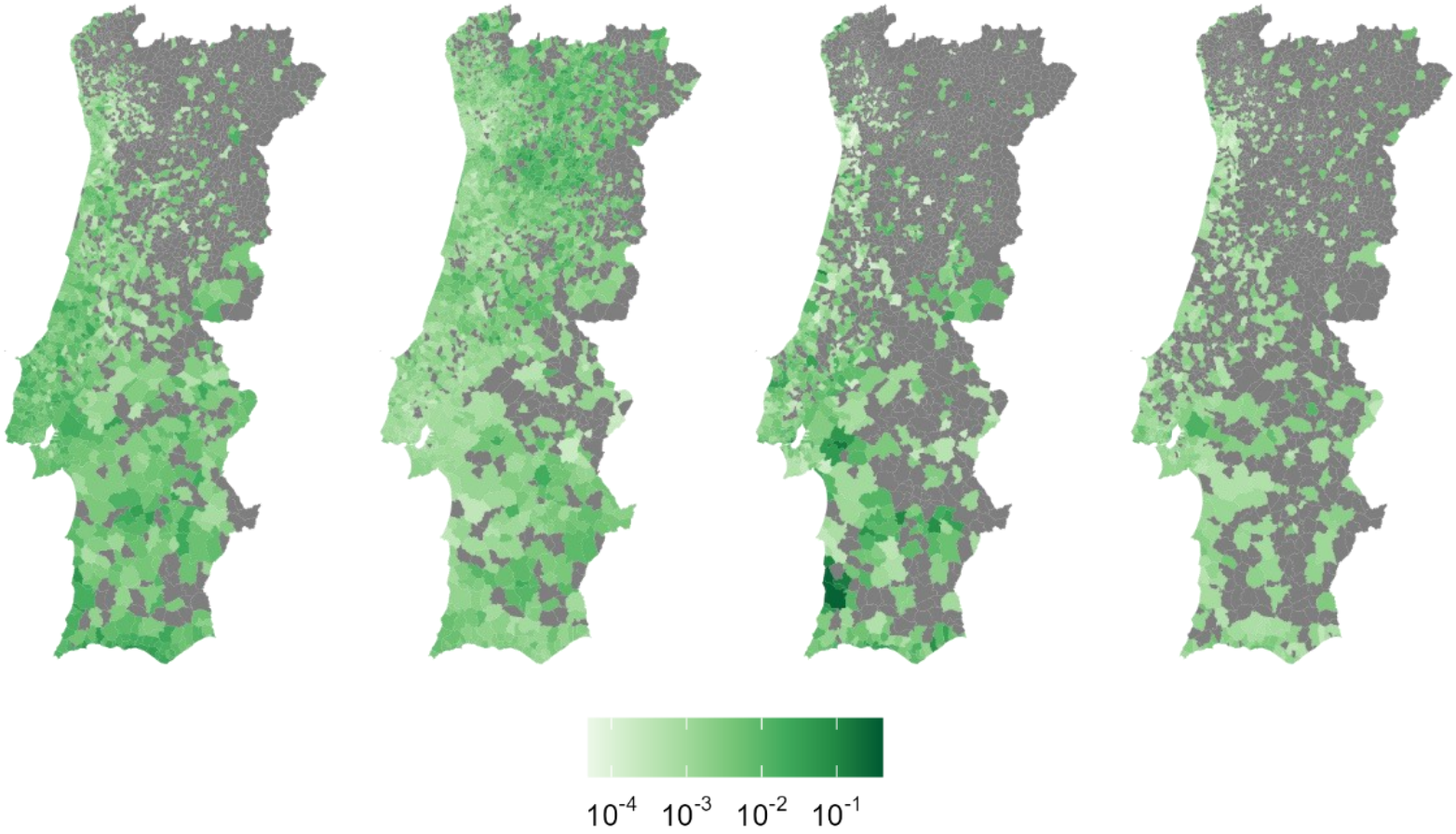
Exploratory results > maps



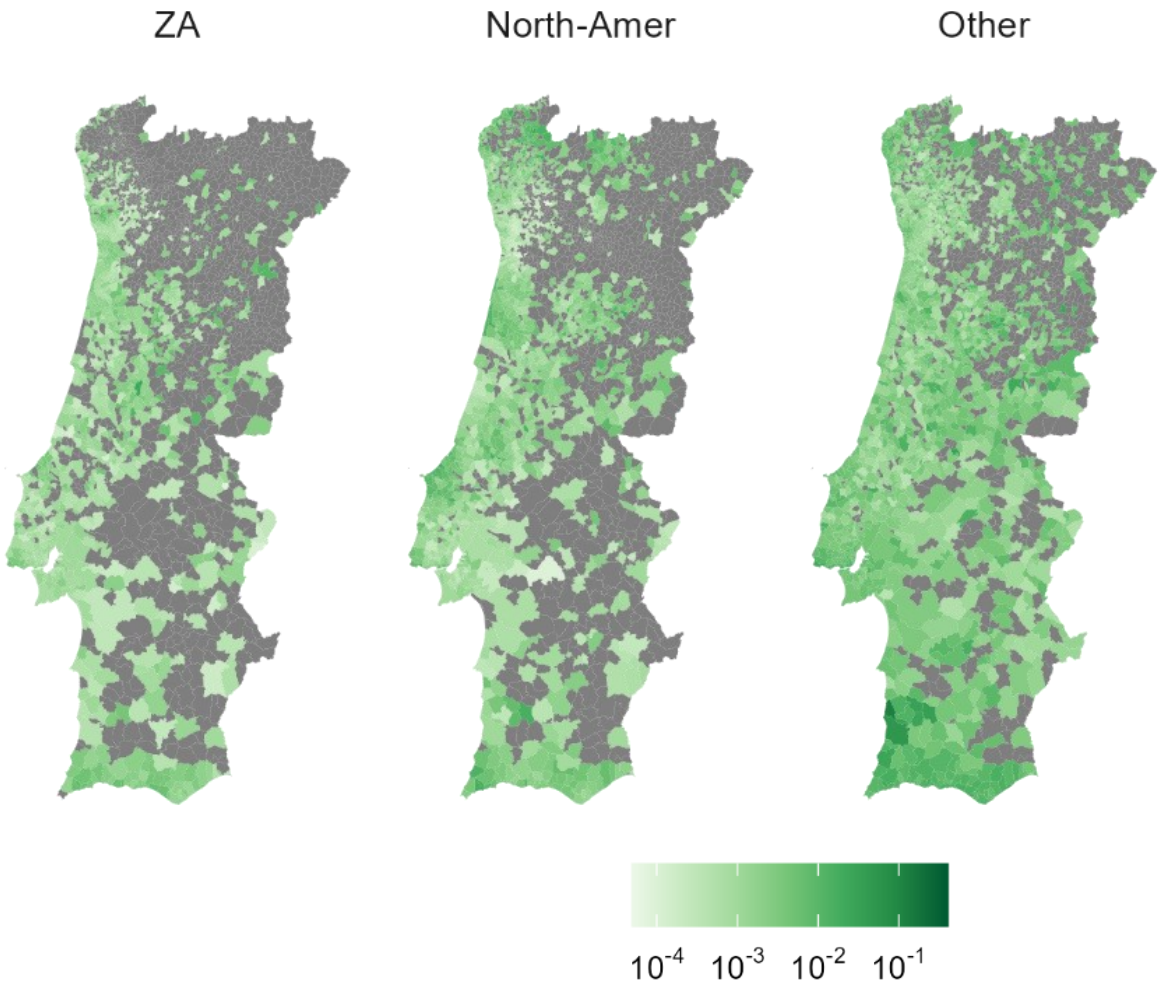
Exploratory results > maps



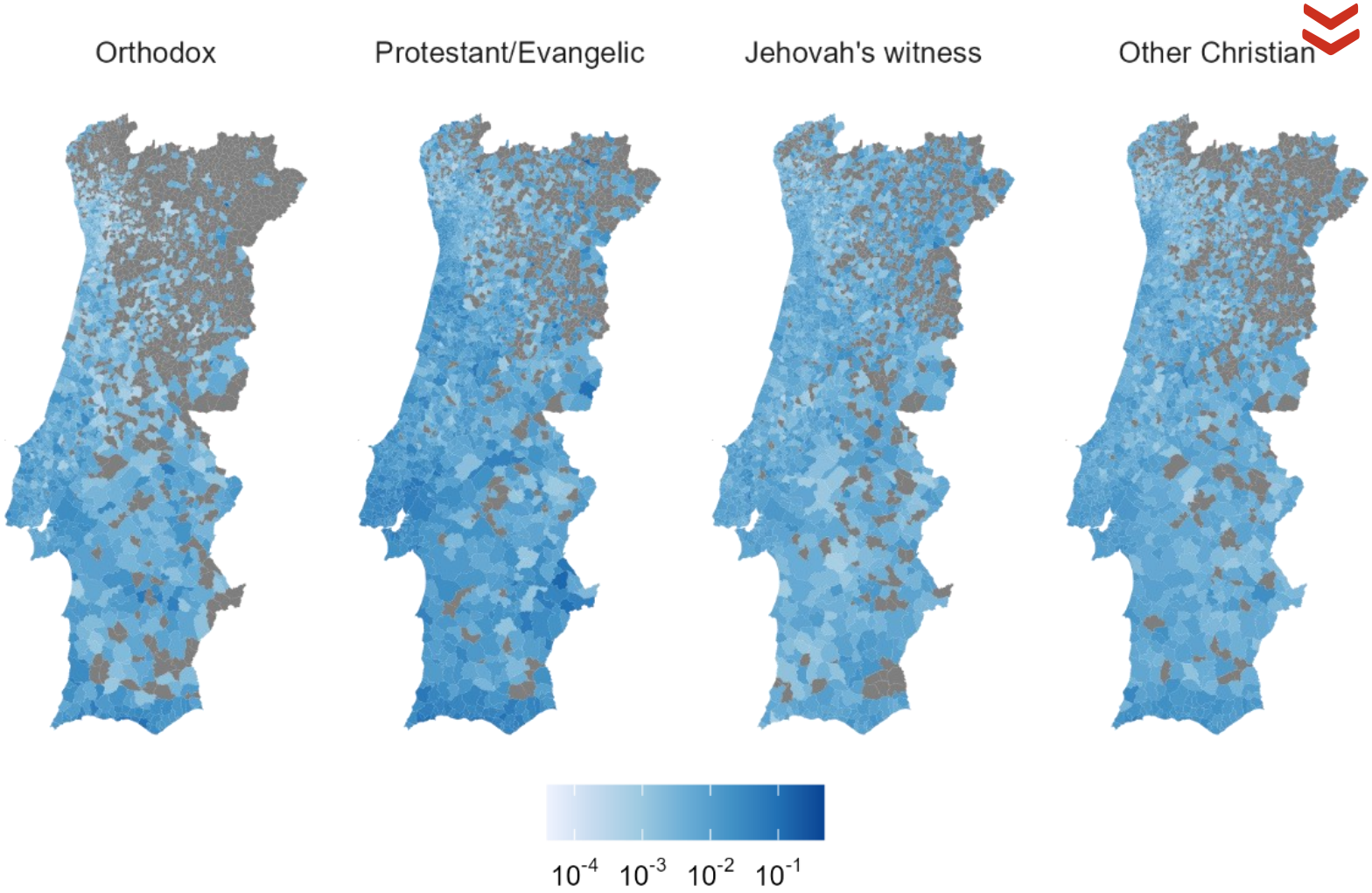
Exploratory results > maps



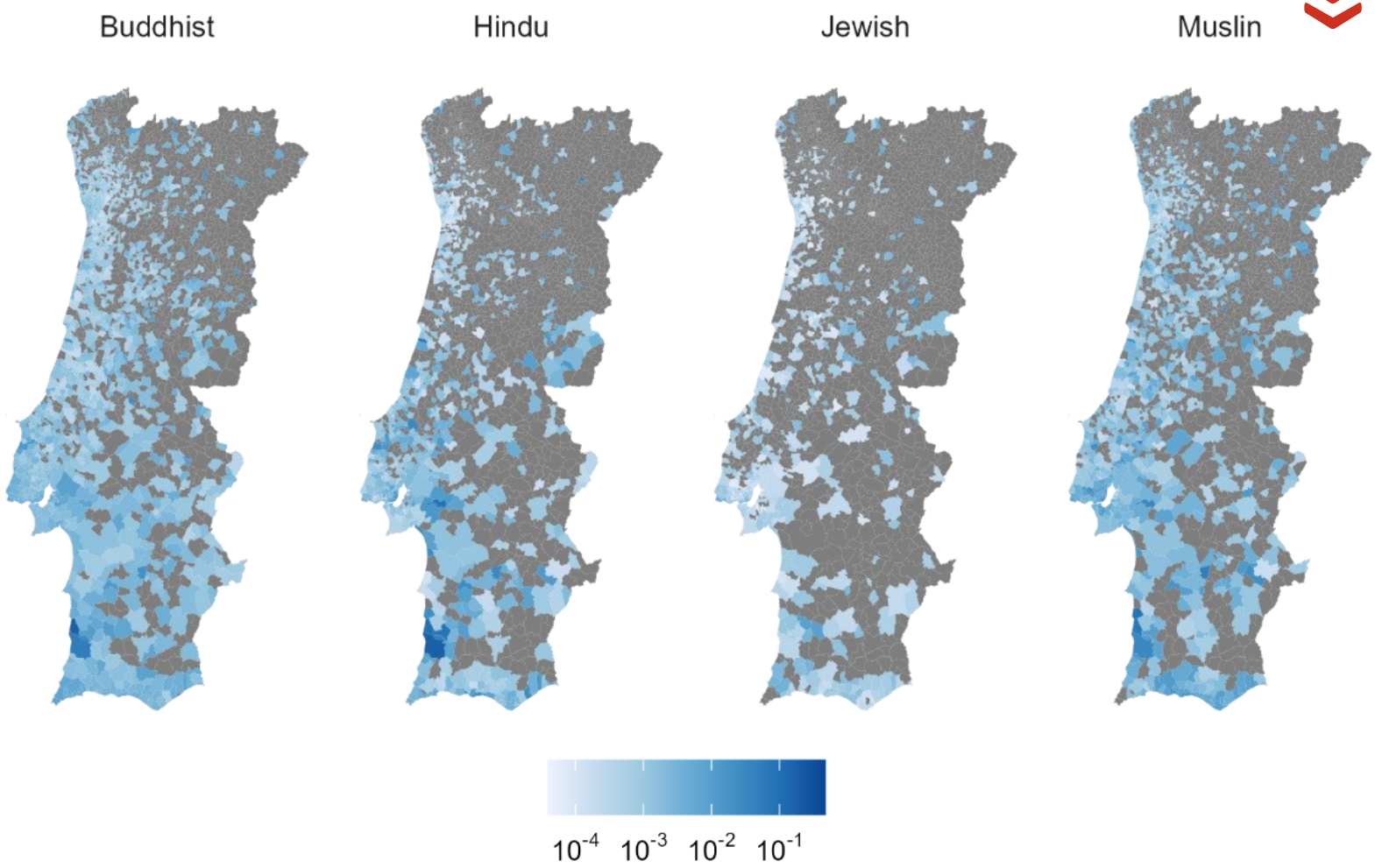
Exploratory results > maps



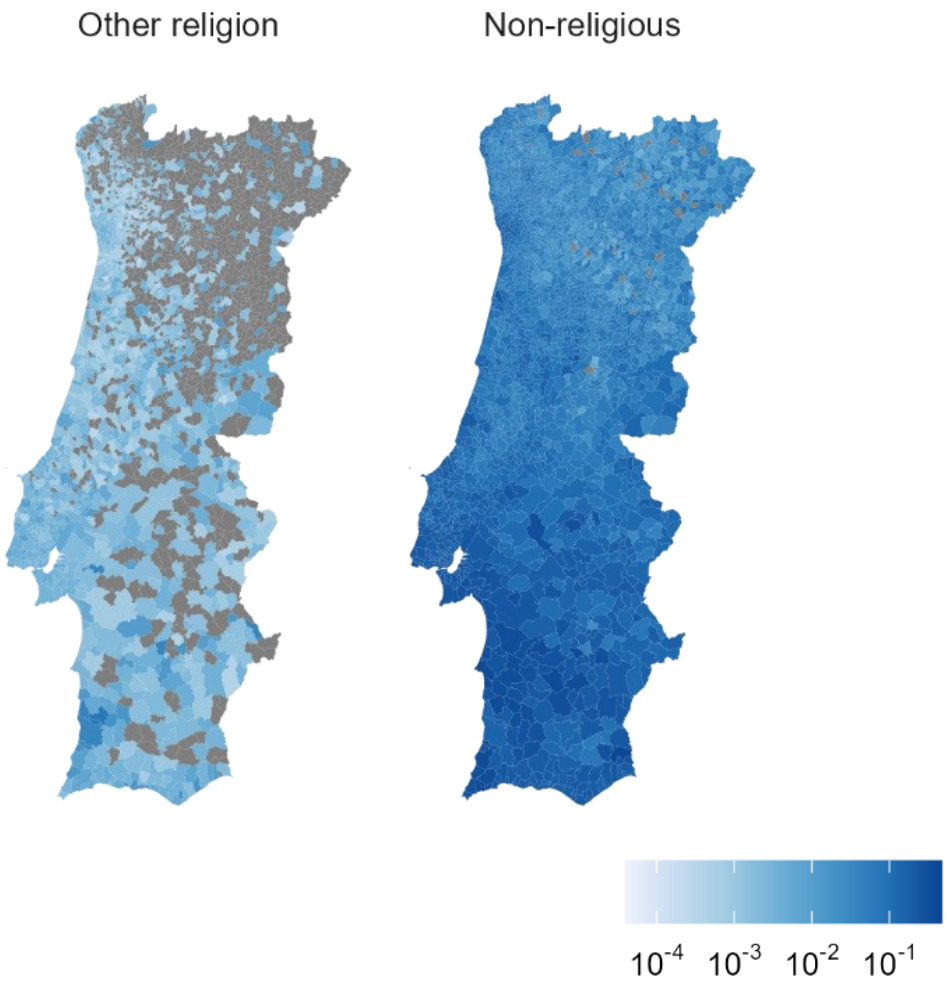
Exploratory results > maps



Exploratory results > maps



Exploratory results > maps



Results > Significance

» Significance thresholds

Variable	P01	P05	P10	P90	P95	P99
Female	46.4%	48.9%	49.8%	54.2%	55.1%	57.4%

Variable	P01	P05	P10	P90	P95	P99
Illiterate	4.8%	5.6%	6.1%	12.8%	14.6%	18.9%

Variable	P01	P05	P10	P90	P95	P99
“Nenhum”	1.9%	3.6%	4.7%	10.1%	11.7%	16.2%
“Básico 1”	13.8%	18.5%	21.8%	48.6%	53.4%	61.8%

Results > Significance

» Significance thresholds

Variable	P01	P05	P10	P90	P95	P99
BR	0.1%	0.1%	0.2%	2.5%	3.8%	6.6%
PALOP	0.1%	0.2%	0.2%	2.6%	3.5%	8.0%
E27 + GB	0.2%	0.5%	0.7%	4.8%	6.1%	11.6%
VE	0.0%	0.0%	0.0%	1.3%	2.8%	7.9%
East-Eur	0.0%	0.0%	0.1%	1.0%	1.5%	2.9%
CH	0.0%	0.1%	0.1%	1.0%	1.5%	2.8%
South-Asia	0.0%	0.0%	0.0%	1.2%	2.8%	9.9%
CN	0.0%	0.0%	0.0%	0.3%	0.4%	1.0%
ZA	0.0%	0.0%	0.0%	0.4%	0.6%	1.6%
North-Amer	0.0%	0.0%	0.0%	0.8%	1.3%	2.4%
Other	0.0%	0.1%	0.1%	0.8%	1.1%	2.0%

Results > Significance

» Significance thresholds

Variable	P01	P05	P10	P90	P95	P99
Orthodox	0.0%	0.1%	0.1%	1.3%	2.0%	4.3%
Protestant	0.1%	0.1%	0.2%	2.9%	3.9%	6.3%
Jehovah's	0.1%	0.1%	0.2%	1.3%	1.6%	2.9%
Other Christ.	0.1%	0.1%	0.2%	1.4%	1.7%	2.5%
Buddhist	0.0%	0.0%	0.0%	0.4%	0.6%	1.3%
Hindu	0.0%	0.0%	0.0%	0.6%	1.4%	3.7%
Jewish	0.0%	0.0%	0.0%	0.2%	0.3%	0.7%
Muslin	0.0%	0.0%	0.0%	0.7%	1.1%	3.1%
Other	0.0%	0.0%	0.1%	0.5%	0.7%	1.7%
No religion	0.6%	1.4%	2.0%	17.3%	22.3%	30.3%

Results > Final

	Description
A	Education-level: Very low.
B	Female ratio: Very low. Naturality: Eastern Europe, Southern Asia, and Other. Religion: Orthodox, Buddhist, Hindu, Muslin, and Other.
C	Naturality: Brazil, PALOP, EU and UK, and Other. Education-level: Moderately high. Religion: Orthodox, Protestant and Other Christians, and Non-religious.
D	Naturality: Brazil, PALOP. Education-level: High. Religion: Protestant and Other Christian, Muslin, and Non-religious.
E	Naturality: EU and UK, and South Africa. Religion: Other Christians.
F	Female ratio: Moderately low. Naturality: EU and UK, and Other. Religion: Orthodox, Protestant and Other Christian, Buddhist, Jewish, Other, and Non-religious.