D2.1
Social vulnerability in R4C demo regions
Regional indicators and narratives

Regions 4Climate

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Deliverable Information Sheet

Version	Final version (revised October 2024)
Grant Agreement Number	101093873
Project Acronym	R4C
Project Title	Regions4Climate
Project Call	HORIZON-MISS-2021-CLIMA-02-04
Project Duration	60 months
Deliverable Number	D2.1
Deliverable Title	Social vulnerability in R4C demo regions. Regional indicators and narratives.
Deliverable Type	R – Document, report
Deliverable Dissemination Level	PUB – Public
Work Package	2
Lead Partner	UCPH
Authors	Christian Fertner, Mette Juhl Jessen, Ole Fryd
Contributing Partners	R4C partners, mainly from Work Package 2, have contributed in the discussion of the deliverable.
Internal reviewers	Main reviewer: Athanansios Sfetsos (NCSR "D") Further comments by several R4C partners, including DRI, FRCT, TECNALIA, REG TOSCANA, SSSA.
Official Due Date	30 September 2023
Delivery Date	27 September 2023 – Revised version delivered 24 October 2024

List of Acronyms

EP	European Parliament
EU	European Union
ISCED	International Standard Classification of Education. Read more on https://ec.europa.eu/eurostat/statistics-explained/index.php?title=International_Standard_Classification_of_Education_(ISCED)
NUTS	The NUTS classification (Nomenclature of territorial units for statistics) is a hierarchical system for dividing up the economic territory of the EU. Read more on https://ec.europa.eu/eurostat/web/nuts/background.
NUTS2	Level 2 of NUTS refers to 'basic regions for the application of regional policies'. Sizes between NUTS2 regions can vary between countries. Currently (definition from 2021, excluding UK), there are 242 NUTS2 regions in the EU. Smaller countries often only consist of one NUTS2 region.
PPS	Purchasing power standard. Read more on: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Purchasing_power_standard_(PPS)
R4C	Regions4Climate
WP	Work package in Region4Climate

Keywords list

- Vulnerability
- Socio-economic analysis
- Indicators
- NUTS2
- Stakeholder interviews
- Vulnerable groups
- Regional strategies
- Climate adaptation

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1. Introduction

The Regions4Climate project

Increasingly frequent extreme weather conditions due to climate change concomitant with unsustainable historical resource use and management practices create the perfect storm - threatening our livelihoods, well-being and environment. A transition towards resilience requires that we simultaneously address social inequalities and implement cross-sectoral innovations to build social, economic and environmental resilience to extreme events. Together, Regions4Climate (R4C) partners commit to addressing current and forecasted climate change related challenges and significantly advancing European regional transitions to climate resilience within an innovative socially engaged, citizen-driven paradigm.

The ambition of R4C is to develop smarter, more inclusive, more resilient regional ecosystems through cross-sectoral innovation jointly created with stakeholders, by and for people. To this end, R4C will provide a suite of validated, user-centred tools and frameworks to support socially just regional climate resilience transitions across Europe, linking new knowledge, innovative technologies and decision-making processes and tools with an in-depth understanding of the social fabric of communities. Learnings from regional demonstrations of co-created cross-sectoral solutions within Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Greece, Italy, Portugal and Spain will provide input for long-term politically adopted and secured resilience strategies. Partner regions will deeply engage with stakeholders to collaboratively (further) develop and implement robust, evidence-based climate resilience action plans, effectively serving as testing grounds for the replicability, adaptability and scalability of a range of climate resilience innovations.

Social vulnerability in R4C partner regions

R4C has a duration of five years. This report is one of the first analyses in the project. It contributes to a better understanding of R4C regions' vulnerabilities. Vulnerability is a key concept in relation to climate change impacts and just resilience. It encompasses the **sensitivity or susceptibility to harm and lack of capacity to cope and adapt** (IPCC, 2023), and forms part of the "core conceptual considerations for the development of indicators for just resilience for Europe" as defined by Lager et al. (2023 p. 12).

Vulnerability may be understood as that of an individual e.g. a person's higher sensitivity to heat waves because of its health condition combined with a lack of resources (adaptive capacity) to cope (e.g. invest in air condition or travel to cooler places), as well as to economic sectors and infrastructure, e.g. certain forms of farming sensitive to changing precipitation (hazard).

The **risk** of climate change related impacts may be understood "as resulting from dynamic interactions among climate-related **hazards**, the **exposure** and **vulnerability**" (IPCC, 2022, emphasis added), while vulnerability may be subdivided into "**sensitivity** and **adaptive capacity**" (Navarro et al., 2022, emphasis added).

The topic of spatial vulnerability is analysed in WP3, hence in the following, we focus on socioeconomic vulnerability. While such separations can be proclaimed, in practice it is difficult to discuss socioeconomic vulnerability separate from hazards and exposure when zooming in on the cases. In fact, many stakeholders talk about exposure (like people living at the coast) when they say vulnerability. As this report is also only a first step, we are inclusive in regard to such uses of the wording on our analysis of the demo regions.

Breil et al. (2018) highlight two contemporary approaches to accessing vulnerability. One originating in the disaster risk management community which is "oriented towards humanitarian assistance, has made use of people-centred,

social science approaches for defining vulnerability that focus on **present day conditions** which determine the way a person or community can be affected by hazards". The other, originating in the climate change impacts community, which "[…] has developed its concept of vulnerability on the basis of natural sciences that focusses on quantitative findings and looks at **projections of impacts in the future** considering the capacities of people and communities to cope with hazards and adapt to them" (Breil et al., 2018 p. 5, emphasis added). Essentially, this is a divide between how and if the hazard in question is to be integrated into the definition of the level of vulnerability in a given situation. In defining indicators, we attempt to bring together the two fields.

Table 1.1 Key terms for this report

Term	Definition in IPCC (2023) and Breil et al. (2018)
Hazard	"The potential occurrence of a natural or human-induced physical **event or trend that may cause loss of life, injury or other health impacts, as well as damage and loss** to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources." (IPCC, 2023)
Exposure	The **presence** of people; livelihoods; species or ecosystems; environmental functions, services, and resources; infrastructure; or economic, social, or cultural assets **in places and settings that could be adversely affected**. (IPCC, 2023)
Vulnerability	The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including **sensitivity or susceptibility to harm and lack of capacity to cope** and adapt. (IPCC, 2023)
Risk	The **potential for adverse consequences** for human or ecological systems, recognising the diversity of values and objectives associated with such systems. In the context of climate change, risks can arise from potential impacts of climate change as well as human responses to climate change. Relevant adverse consequences include those on lives, livelihoods, health and well-being, economic, social and cultural assets and investments, infrastructure, services (including ecosystem services), ecosystems and species. In the context of climate change impacts**, risks result from dynamic interactions between climate-related hazards with the exposure and vulnerability** of the affected human or ecological system to the hazards. (IPCC, 2023)
Adaptive capacity	"The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences." (Breil et al., 2018 p. 17, extracted from Agard et al., 2014)
Social vulnerability	"A state resulting from interaction of socio-economic and environmental characteristics, such as personal sensitivity, economic deprivation or housing conditions, affecting how prone to harm from climate-related events people and communities are (after Lindley et al. 2011)." (Breil et al., 2018 p. 16)

Approach and methodology

Our method includes two approaches: First, we provide a general baseline analysis of the socio-economic situation of the regions by analysing data from Eurostat, comparing each region to their respective country and to the other demo regions. Second, we present thematically structured narratives on social vulnerability across the regions. The narratives were gathered through a mini-survey among the case stakeholders, a screening of climate (adaptation) plans and 12 online semi-structured interviews with regional stakeholders, one in each demo region.

The twofold approach provides insights into the status of how social vulnerability in climate adaptation is experienced, expressed and understood across the regions. Both, in terms of the tales told by regional indicators, and the understanding, concerns and approaches found among stakeholders. This initial analysis does not provide an exhaustive survey but allows for multiple voices and perspectives on how this topic is currently understood and approached in climate adaptation across different contexts. Such an understanding will help to qualify the framework, modelling and roadmap building in the Regions4Climate project.

More details on the specific methodology can be found in the beginning of chapter 2 and 3.

The annex includes background material as separate files:

- Excel file with **regional indicators**
- **Mini-survey**
    - Questionnaire send out in January 2023 to the 12 demo regions.
    - Summary table of results
- **Interviews**
    - General interview guide which was slightly adapted for each interview.
    - Interviews were recorded and automatically transcribed. Letters of consent were collected from all participants allowing to share the transcripts for internal use (R4C project partners).

Internal review and perspectives for further work in R4C

First preliminary results have been presented at an internal R4C webinar in July 2023. The final report was internally reviewed and results have been presented at another internal R4C webinar in September 2023. Several partners have provided valuable feedback – some was directly incorporated in the final version, some has to be kept for later work in R4C, but is documented in this report (e.g. suggestions for further indicators at the end of section 2.1).

Results are meant to feed into the further work of R4C. Different elements can be relevant for different work packages (WP) in the project:

- WP2: to provide input for system mapping and roadmaps with regional indicators and narratives.
- WP3: to contribute to a more detailed indicator development with the regional indicators and the classification of vulnerable groups.
- WP4: to aid the baseline understanding for the climate and societal transformation within a resilience framework.
- WP5: to implement innovation actions which consider social vulnerability to climate change or adpatation
- WP6: to provide insights into specific problems/challenges in each region for the regional innovation roadmaps.
- WP7: to provide definitions and insights into case regions' challenges.

Revision October 2024

Following suggestions from the regular review of R4C from June 2024, this report was revised. Changes include: (1) Additional indicators on transport infrastructure derived from OpenStreetMap; (2) Additional data on NUTS3 level where possible (mainly indicators on demography); (3) Additional reflections on results of indicator analysis; (4) Extended sub-section conclusions chapter 3; (5) Improved conclusions; (6) Several minor changes across the document to improve readability.

2. Regional indicators on social vulnerability

2.1. Introduction and approach

The 12 regions of R4C are spread across different contexts and geographies of Europe. They are of very different population size (from below 100,000 to 3 million inhabitants), settlement structure (from island and rural to metropolitan areas), facing different climate and challenges from climate change, and having diverse governance structures to respond and adapt. To learn from each other, understand differences and shared challenges, and also to offer each region a contextual perspective, several work packages in R4C will provide a common baseline and go in depth with certain aspects (WP3 with climate resilience assessment, WP4 with governance strategies or WP5 with implementation processes). In this part of Task 2.1 we analyse the basic socio-demographic and socio-economic situation of the regions, to better understand potential social vulnerabilities.

For this first basic comparative analysis we work with NUTS2 regions, in some cases, where possible with NUTS3 or data representing the actual case area. NUTS is a territorial unit system for statistical purposes in Europe with different levels[1]. NUTS2 refers to bigger sub-national regions. In total there are 242 NUTS2 regions in the EU, but the system also covers other European countries. Many of the smaller countries in Europe consist of only one NUTS2 region, i.e., the NUTS2 region is the same as the country. This is e.g. the case for Estonia or Cyprus, with one R4C demo region each.

Using NUTS2 has the advantage that we can access a wide range of standardised and harmonised variables for comparable regions directly through Eurostat's public database[2]. NUTS2 does not always fit the actual demo regions in R4C, but it fulfils the purpose of providing a first overview across the regions.

Table 2.1 shows the population in the R4C demo regions and in the corresponding NUTS2 and NUTS3 regions used in this analysis. Biggest misalignments regard:

- Nordic Archipelago: The cross-border region includes a huge area from Stockholm to Helsinki with the Åland Islands in its heart. We chose only the actually territory of the Åland islands for this analysis.

- Køge Bay: The demo region consists of 11 municipalities along the Køge Bay. The municipalities are spread across two bigger administrative regions (Capital Region and Region Zealand), each a NUTS2 region. They are also spread across four NUTS3 regions. For the analysis we calculated the values for the two NUTS2 (resp. the four NUTS3) regions together.

- Troodos network (Cyprus): Cyprus consist of only one NUTS2 region. The values might hide certain patterns in the Troodos region, which is a very rural and inland part of Cyprus, while Cyprus as a whole includes several cities and coastal areas. Only 3 % of the Cypriot population live in the Troodos region. For Pärnumaa, a NUTS3 region exists coming closer to the actual case area.

- Besides Køge Bay and Troodos, several NUTS2 regions are considerably bigger than the R4C demo regions, including South Aquitaine (FR), Burgas (BG), Pärnumaa (EE) and Sitia (EL). For indicators related to demography and transport infrastructure more detailed data (on R4C case or NUTS3 level) was available and used.

[1] Read more on https://ec.europa.eu/eurostat/web/nuts/background.
[2] Eurostat's public database: https://ec.europa.eu/eurostat/web/main/data/database

The maps in Figure 2.1 show the different territories of the R4C demo regions and the used NUTS2 regions.

Table 2.1 Overview of population in R4C demo regions and NUTS2 regions

R4C case	Geographical definition	Population in R4C case (2021/22)	NUTS2 region	Population in NUTS2 (2022) and R4C case share	NUTS3 region	Population in NUTS3 (2022) and R4C case share
Basque Country (ES)	Basque Country	2.167.323	ES21 (Basque Country)	2.167.323 (100%)	-	-
South Aquitaine (FR)	Communauté d'agglomération du Pays Basque", 158 communes	309.066	FRI1 (Aquitaine)	3.414.585 (9%)	FRI15 (Pyrénées-Atlantiques)	697.701 (44%)
Azores (PT)	Azores islands	245.283	PT20 (Azores)	245.283 (100%)	-	-
Tuscany (IT)	Tuscany Region	3.742.437	ITI1 (Tuscany)	3.742.437 (100%)	-	-
Køge Bay (DK)	11 municipalities	982.149	DK01, DK02 (Capita & (Zealand)	2.639.957 (37%)	DK011, DK012, DK021, DK022	2.202.537 (45%)
Burgas (BG)	Burgas municipality	205.329	BG34 (Southeast)	1.046.125 (20%)	BG341 (Burgas)	379.023 (54%)
Helsinki-Uusimaa (FI)	Uusimaa	1.638.293	FI1B (Helsinki-Uusimaa)	1.638.293 (100%)	-	-
Pärnumaa (EE)	Pärnu County (7 municipalities)	85.760	EE00 (Estonia)	1.315.635 (7%)	EE004 (Lääne-Eesti)	145.721 (59%)
Sitia (EL)	Sitia municipality	18.318	EL43 (Crete)	632.674 (3%)	EL432 (Lasithi)	77.690 (24%)
Castile and León (ES)	Autonomous community Castile and León	2.435.951	ES41 (Castilla y Léon)	2.435.951 (100%)	-	-
Nordic Archipelago (SE/FI)	Huge cross-border region[3]	30.359 (Åland)	FI20 (Åland)	30.359 (100%)	-	-
Troodos network (CY)	Several rural municipalities	27.908	CY00 (Cyprus)	854.802 (3%)	n/a	n/a

[3] The Nordic Archipelago cooperation (https://skargardssamarbetet.org/en) covers a huge cross-border region from Östergotaland and Stockholm in Sweden to the Åland islands and the Finnish south coast. The region also includes Helsinki-Uusimaa, which is a case region for itself in R4C. For the quantitative comparison we focus only on the Åland Islands, the geographic centre of the cross-border cooperation.

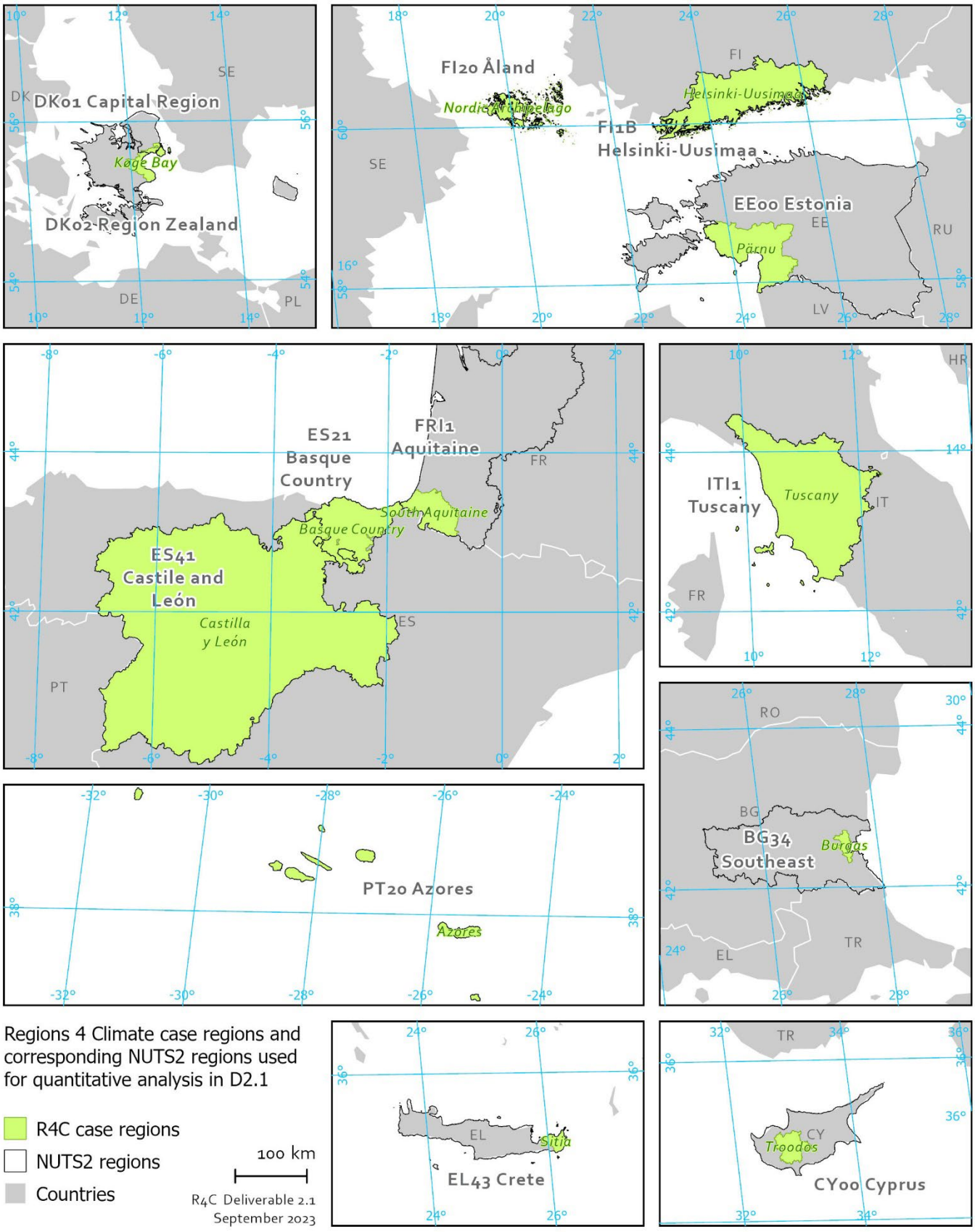

Figure 2.1 Map of R4C demo regions and corresponding NUTS2 regions

We include both “present day conditions” (population, demographics, employment and income, poverty, education, health), and indicators informed by the hazards identified by stakeholders across the regions (agriculture and tourism, accessibility and public participation). Also, it is important to underline, following Lager et al. (2023 p. 14), that “[v]ulnerability is multidimensional and furthermore a person cannot be defined by a single attribute such as an older person, a person with a low income, a certain gender or other.”

For a comparative perspective, we choose indicators representing ratios or shares – e.g. the share of elderly on the total population or the income per inhabitant. Besides the values for the 12 regions, we also include national values from the respective countries to see if regions diverge from their countries in specific areas, contributing to a better understanding of the regions’ national context. The indicators do not include trends or a time perspective (except population change) but show only the most recent numbers.

Table 2.2 List of indicators and description of rational

Group	Indicator	Best spatial level avail.	Rational in relation to social vulnerability
Population	Population in total, 2022	Case	Population decline indicates changing and challenging demographics. Lower population density can indicate longer distance to services etc. High population density can also be a problem because of overcrowding and overuse of infrastructure. However, this is something which would typically be seen in specific city districts and not on regional scale.
	Population change, 2012-2022	NUTS3	
	Population density, 2022	Case	
Demography	Elderly (70 and older), 2022	NUTS3	Elderly have often more vulnerable health conditions. Single households can be more socially vulnerable due to factors such as limited social support, economic strain, isolation, caregiving challenges.
	Children (below 15), 2022	NUTS3	
	Women/man ratio, 2022	NUTS3	
	Single households, 2011	NUTS2	
Income and unemployment	Income (purchasing power per person), 2020	NUTS2	People with lower incomes often have fewer resources to access essential services. Unemployment can reduce financial stability, access to resources, and increase social isolation.
	Unemployment rate, 2020	NUTS2	
Poverty	Risk of poverty rate, 2020	NUTS2	Poverty often implies limited access to healthcare, education, and essential services.
	Severe material deprivation rate, 2020	NUTS2	
Education	Low education (up to ISCED 2), 2022	NUTS2	Low education can imply limited access to well-paying job opportunities, and fewer skills to adapt to changing circumstances.
	Lifelong learning, 2022	NUTS2	
Agriculture and tourism	Employment in agriculture, fisheries and forestry, 2021	NUTS2	Agriculture (and those employed) as well as the primary sector as a whole is especially impacted by changing climate. The tourism sector has also been mentioned by many R4C cases as being under pressure from changing climate as well as necessary adaptation measures.
	Tourist arrivals per inhabitant, 2021	NUTS2	
Health	Medical doctors per inhabitant, 2020	NUTS2	Good health care and general health condition (life expectancy as proxy indicator) can imply a high resilience to cope with extreme events as e.g. heat waves.
	Life expectancy at birth, 2021	NUTS2	

Voting and digital accessibility	Voter turnout at EP election, 2019	NUTS2	Lower participation in democratic processes and low digital interaction with public authorities may suggest barriers to civic engagement and access to government services.
	Digital interaction with public authorities, 2021		
Infrastructure	Motorway per area, 2024	Case	Higher length of motorways and railways is related to a better connectivity as well as to better resilience in case of disaster (higher number of alternative routes)[4]
	Railway per area, 2024	Case	

During the internal review of this report (done in September 2023), suggestions for further indicators were made by R4C partners. Some were integrated, other suggestions were not possible to integrate because of reasons of feasibility, data availability, as well as the aim to not overload the analysis. However, the suggestions might be relevant for the further work in R4C and are therefore listed here:

- More demographic insights as e.g. ethnicity, migration or different age groups.
- Disaggregated insights into primary sector employment (e.g. splitting up of agriculture, fisheries, livestock farming, mining etc.).
- Detailed insights into the tourism sector.
- Energy poverty is included in risk of poverty and material deprivation, however, a separate focus on it might be useful.
- General infrastructure availability (transport, communication, emergency services) – some of it is covered in our indicators, but a separate focus could be useful. Here it would be important to not only consider the endowment with facilities, but the actual use/functioning/efficiency of those.
- In parallel to the above, availability of social support structures (related to adaptive and cooping capacity)
- Better consideration of the settlement structure and the actual spatial pattern within regions as we can assume that certain indicators are much more pronounced in sub-regions (e.g. rural or peripheral areas) of the sometimes very big NUTS2 regions.
- Intersectionality of indicators. Vulnerability develops from the combination (intersection) of several factors. Our analysis is limited in that respect as we only work with regional aggregates. Our work can be used as an input for the regions, who need to interpret the results themselves. We do not evaluate single regions but hold it to a descriptive approach.

[4] JRC Risk Data Hub, https://drmkc.jrc.ec.europa.eu/risk-data-hub/media/vulnerability/Indicators_and_References.pdf, accessed October 2024

2.2. Population

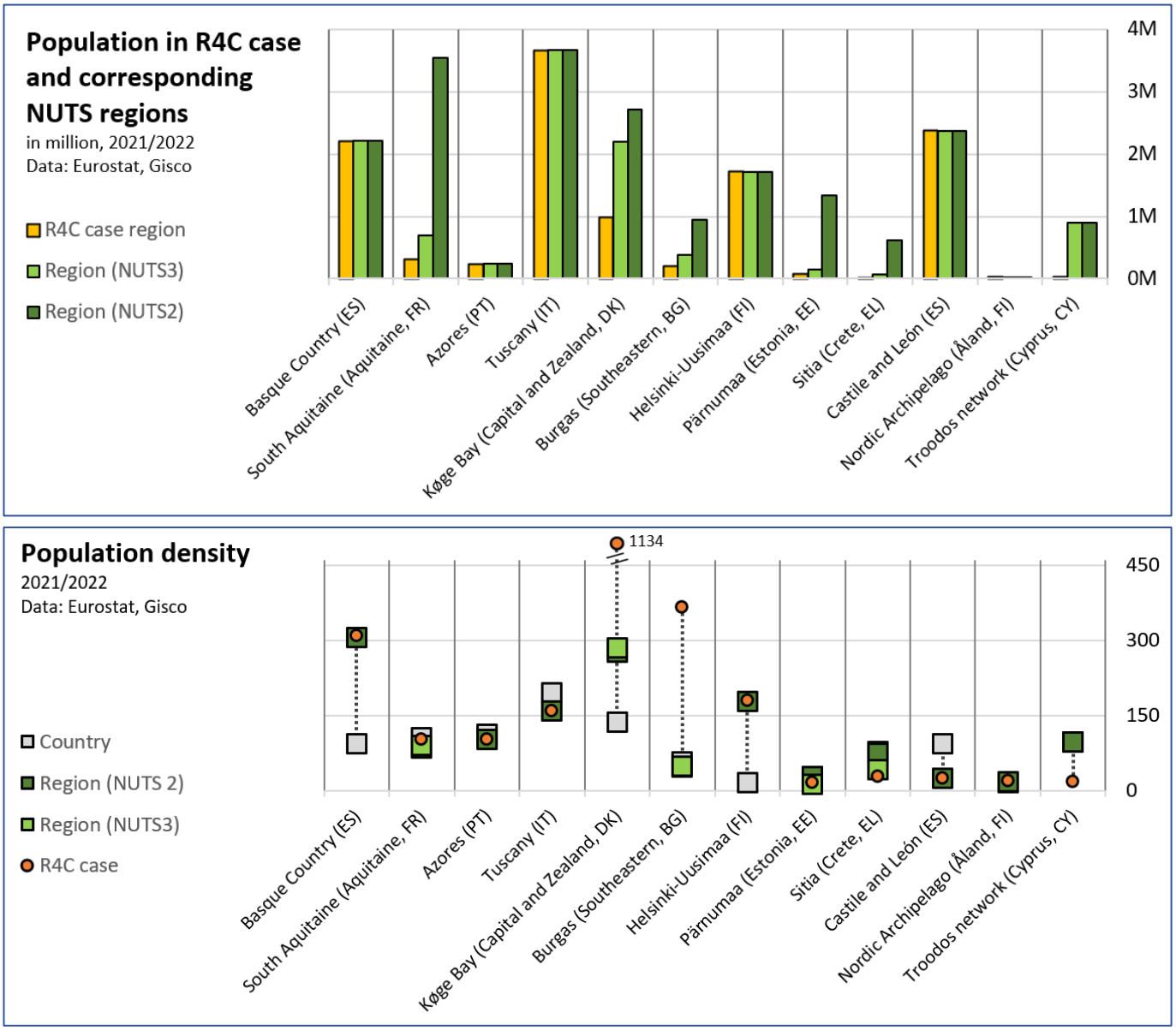

Figure 2.2 Population and population density in R4C regions

Four of the 12 R4C regions have more than one million inhabitants. Looking at the corresponding NUTS2 regions, the number increases to eight. The remaining four are all islands (Azores, Crete, Åland and Cyprus).

Population density varies on the different spatial levels (demo region, NUT2, country). Comparing density in demo regions and the respective NUTS2 region, most differences are in Køge Bay and Burgas (much denser in demo region than in NUTS2 region) and in Sitia and Troodos (less dense in demo region than in NUTS2 region). Pärnumaa, Sitia/Crete, Castile and León, Nordic Archipelago/Åland and Troodos/Cyprus have all below 100 inhabitants per km2 in demo region and NUTS2 region.

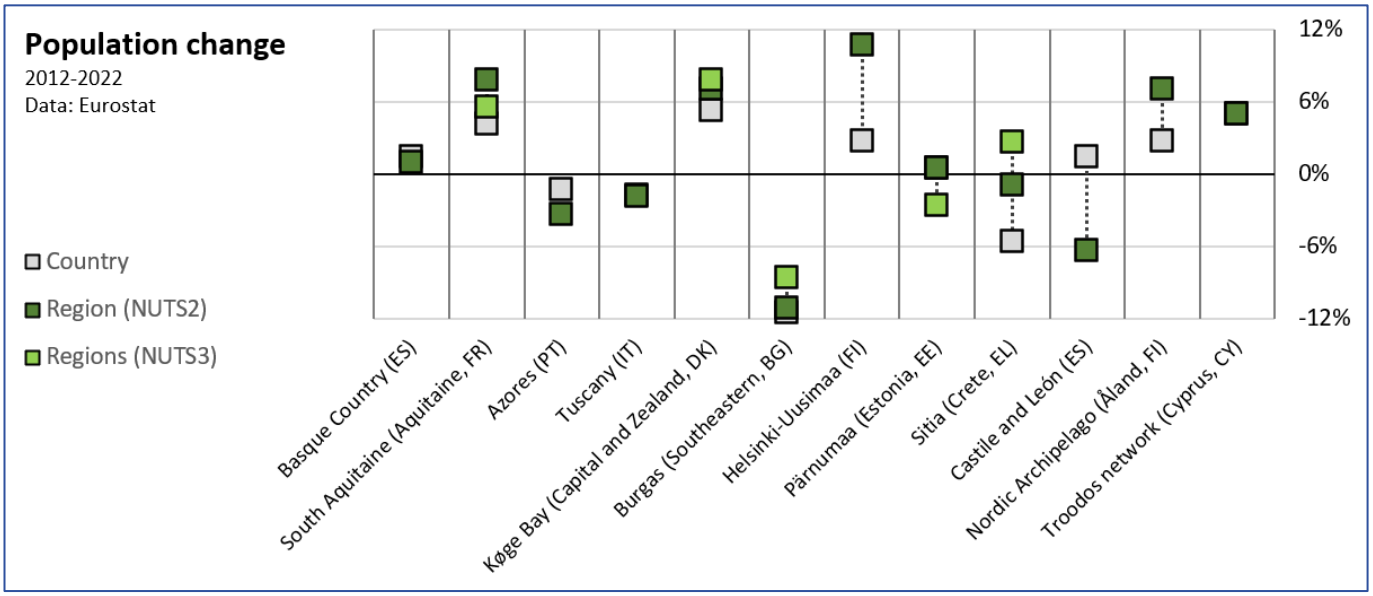

Figure 2.3 Population changes in R4C regions

Looking at population change, we can see considerable differences between the regions. Six regions have lost population in the past 10 years, with Burgas (BG) experiencing the biggest losses (-9% over the past 10 years), followed by Castile and León (ES) with -6%. Helsinki-Uusimaa experienced the strongest growth (+11%), followed by Køge Bay and Åland.

2.3. Elderly, children, women and single households

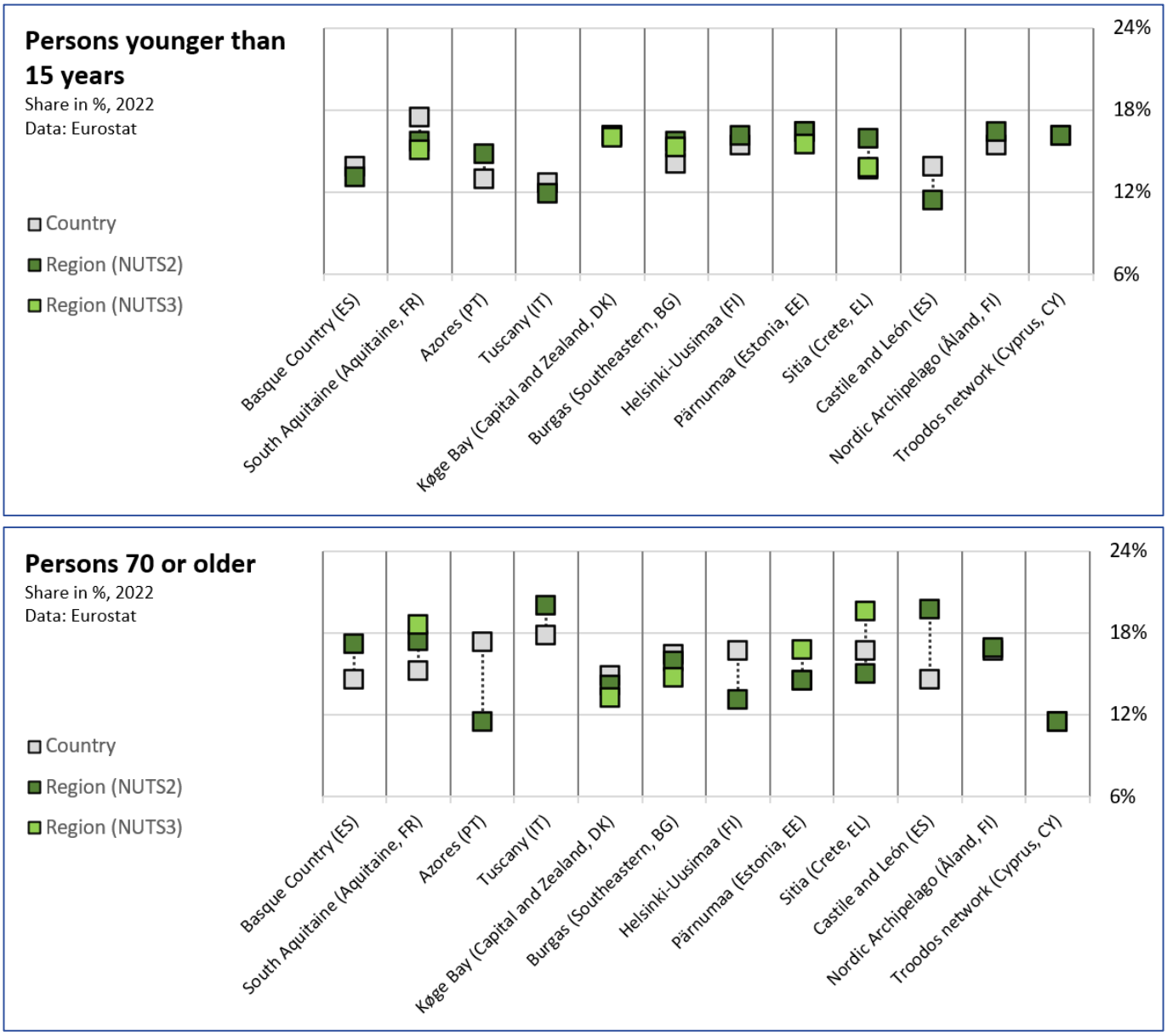

Figure 2.4 Elderly and children in R4C regions

Castile and León (ES) and Tuscany (IT) have the lowest share of children, where the other regions are more similar to each other. In parallel, Tuscany and Castile and León have the highest share of people 70 or older (20%), in the case of the latter also considerably higher than on the national level. Cyprus and the Azores (PT) have the lowest share (11.5% each).

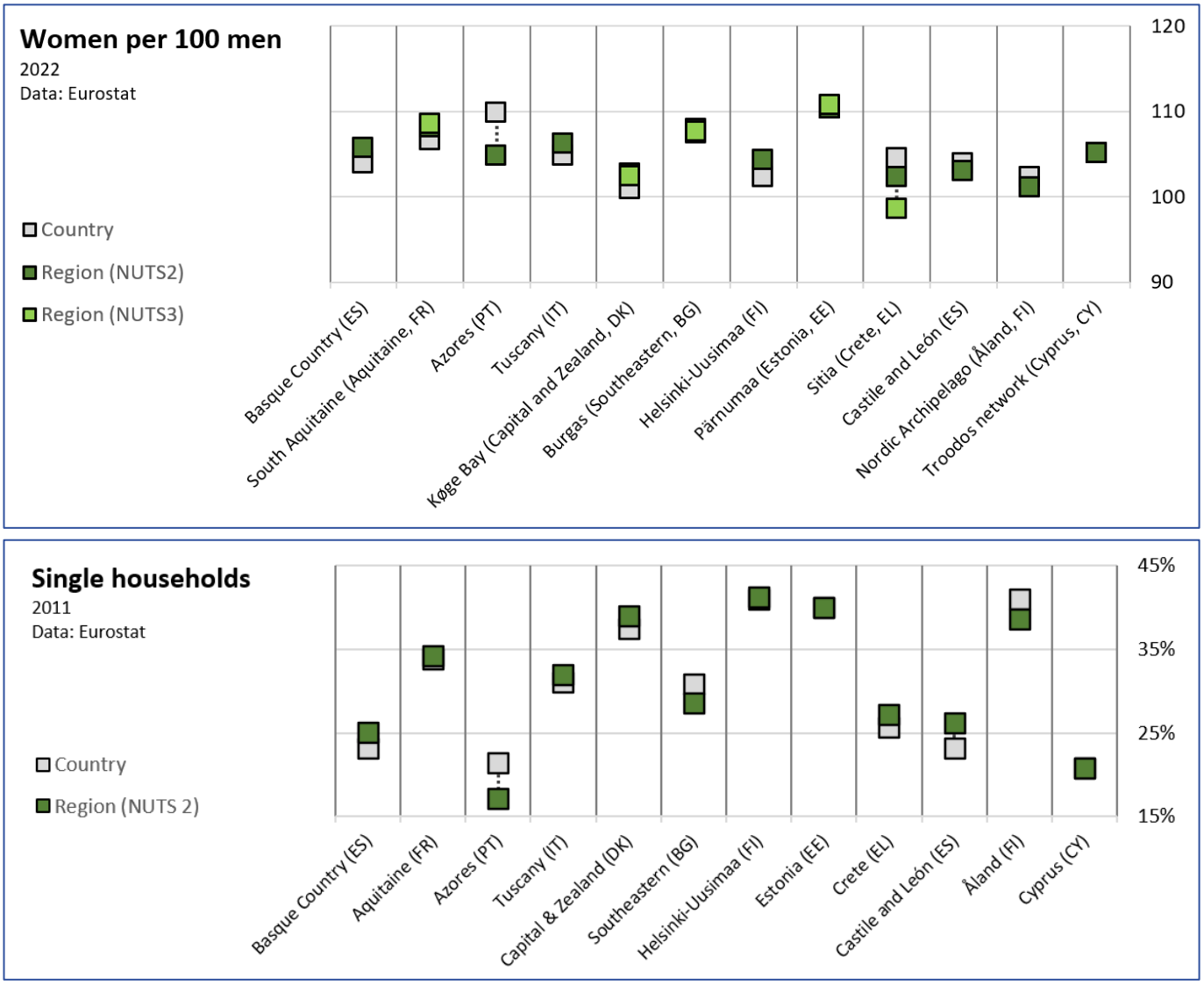

Figure 2.5 Women/men ratio and single households in R4C regions

In all regions, with the exception of Sitia, there are more women than men. Estonia and Aquitaine (FR) have the highest number of women compared to men (110 and 108), Åland (FI) has the lowest (101). For single households, Helsinki-Uusimaa (FI) has the highest share (41%). Estonia, Åland, Capital and Zealand regions in Denmark, Aquitaine and Tuscany have all over 30% single households.

2.4. Income and unemployment

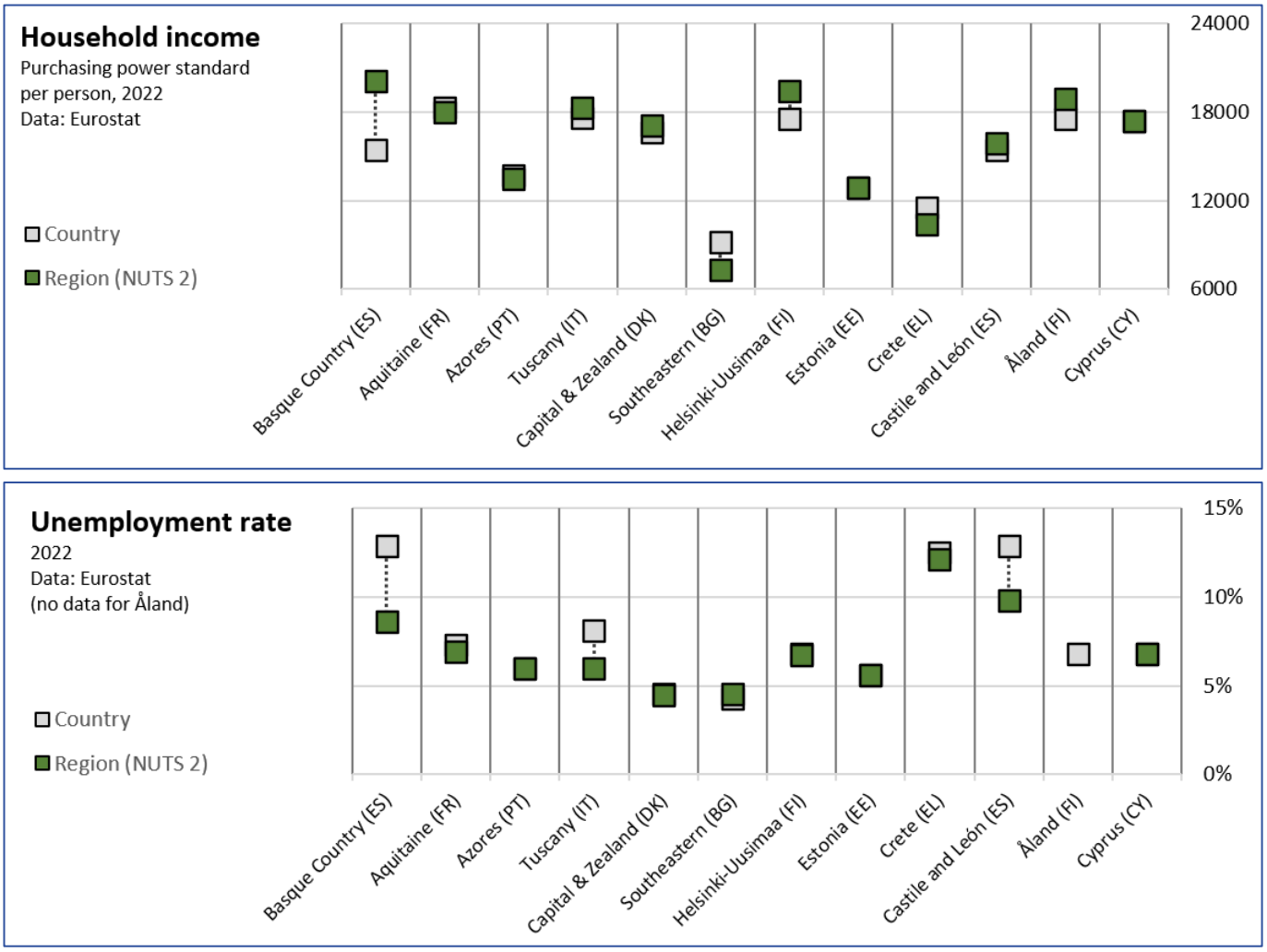

Figure 2.6 Income and unemployment in R4C regions

Southeastern (BG), Crete (EL), Estonia and Azores (PT) have an average person income below 15000 of purchasing power standard (PPS)[5]. The first two have also a lower income than in their respective countries. The highest income in PPS has Basque Country (ES), Helsinki-Uusimaa and Åland (both FI), also higher than their countries.

Basque Country, Tuscany (IT), and Castile and León (ES) have a significantly lower unemployment rate compared to their country. The other regions have rate comparable with the national level. Crete is the region with the highest unemployment among the 12 regions.

[5] The purchasing power standard (PPS) is an artificial currency unit. One PPS can buy the same amount of goods and services in each country. Read more on: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Purchasing_power_standard_(PPS)

2.5. Poverty

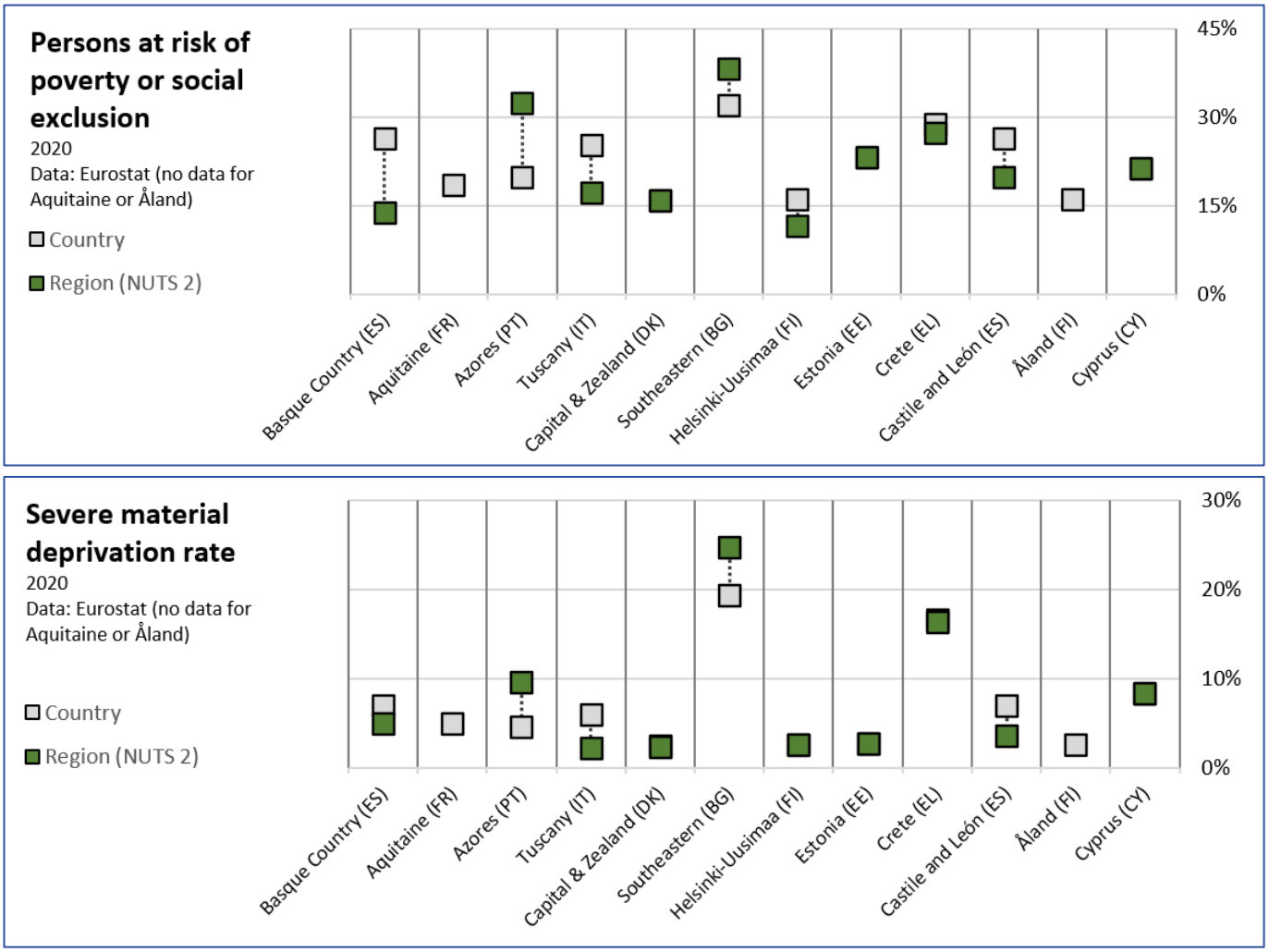

Figure 2.7 Risk of poverty and severe material deprivation in R4C regions

People at risk-of-poverty have a disposable income (after social transfer) below 60 % of the national median disposable income. Risk of social exclusion includes households with low work intensity or material deprivation. The latter reflects the proportion of people whose living conditions are affected by a lack of resources.[6]

Southeastern (BG), Azores (PT) and Crete (EL) have the highest risk of poverty rate with over 25%. They have also relatively high rates of severe material deprivation, whereas Southeastern with 25% and Crete with 16% stick out from the rest of the regions.

[6] Severe material deprivation rates represent the proportion of people living in households that cannot afford a number of items: like pay their rent, heating, holiday, telephone etc. Read more definitions of risk-of-poverty and material deprivation on https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:At_risk_of_poverty_or_social_exclusion_(AROPE), accessed September 2023.

2.6. Education and learning

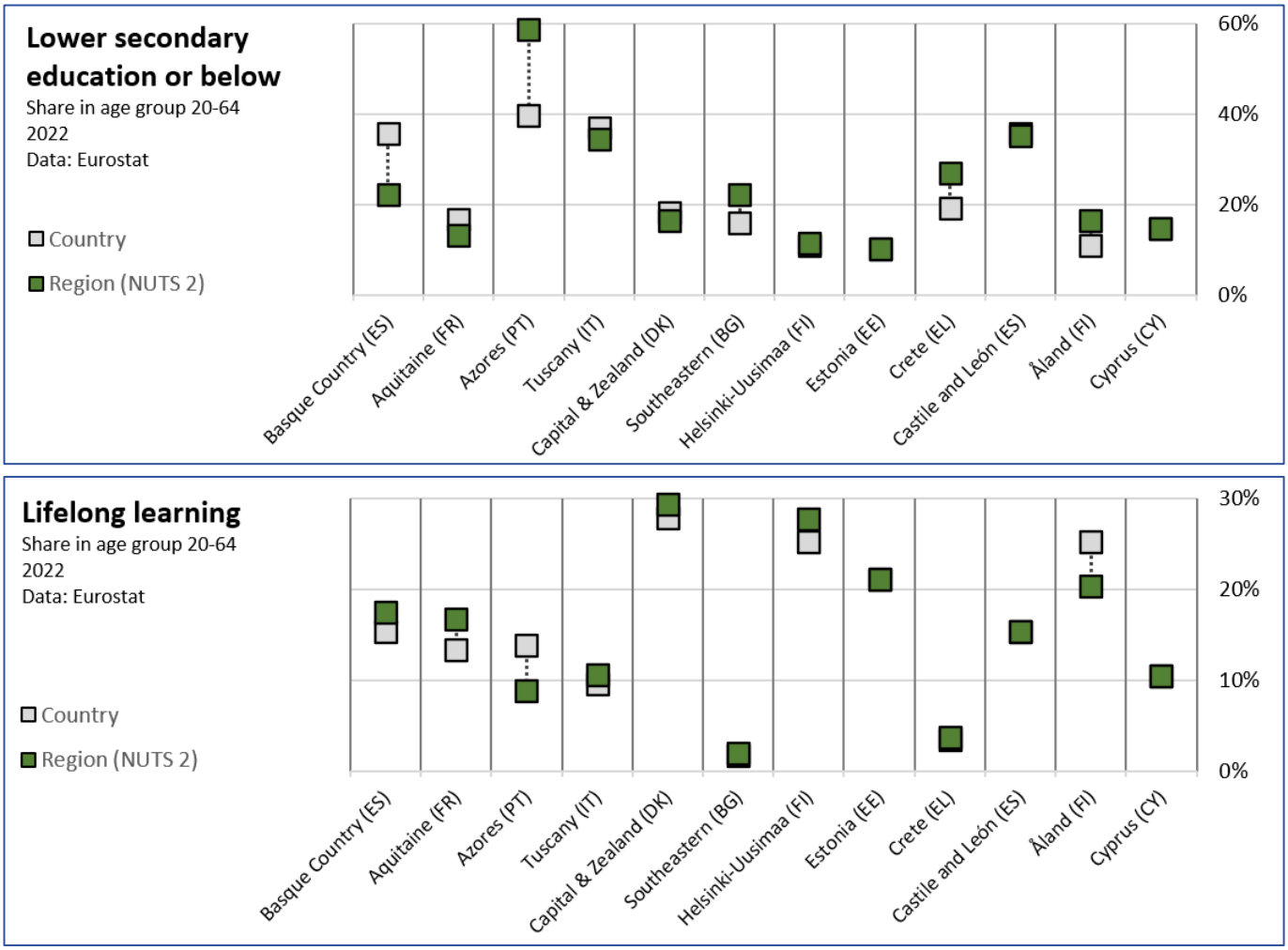

Figure 2.8 Lower secondary education and lifelong learning in R4C regions

Azores (PT) has by far the highest share of people with only up to lower secondary education (ISCED level 2), also considerably higher than in the whole of Portugal. Rates of people with low education are also relatively high in Tuscany (IT) and Castile and León (ES), however, in similar levels as in their respective country.

The lowest participation of adults (20-64 years) in lifelong learning[7] has Southeastern (BG) and Crete (EL), also corresponding with levels in their respective countries.

[7] Lifelong learning encompasses all learning activities undertaken throughout life. Adult learning means the participation of adults in lifelong learning. Read more on https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Lifelong_learning_(LLL)

2.7. Agriculture and tourism

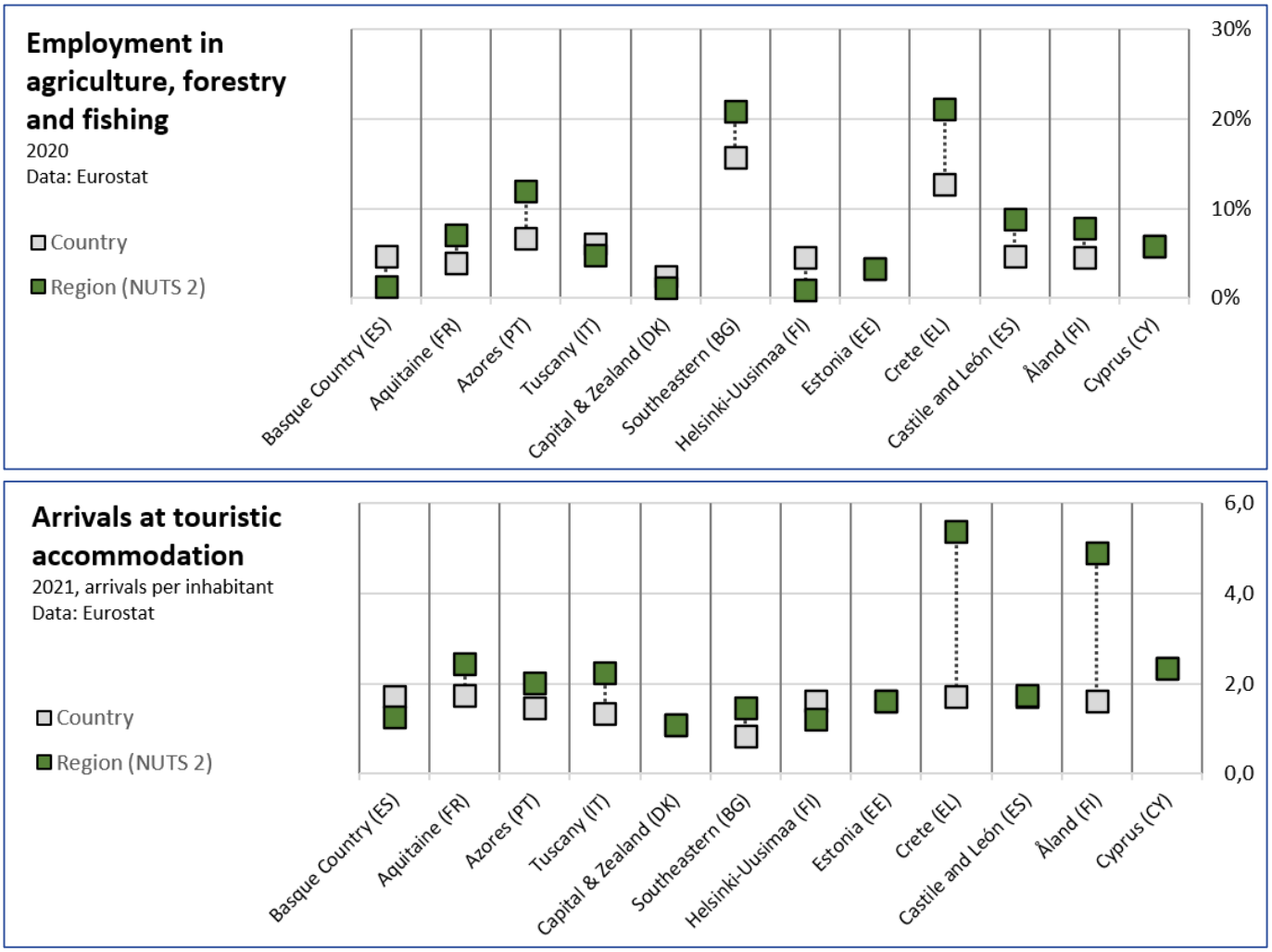

Figure 2.9 Employment in agriculture and touristic arrivals in R4C regions

Employment in agriculture, forestry and fishing is highest in Crete (EL) and Southeastern (BG). There the share is also significantly higher than in Greece and Bulgaria respectively. Also, several other regions have considerably large share of people working in this sector compared to the national level, including Aquitaine (FR), Azores (PT), Castile and León (ES) and Åland (FI).

Regarding touristic arrivals per inhabitant, Crete (EL) and Åland (FI) stick remarkably out. Tourism plays a huge role in these regions. Aquitaine (FR), Azores (PT), Tuscany (IT) and Southeastern (BG) have higher touristic arrivals per inhabitant than their respective countries.

2.8. Health

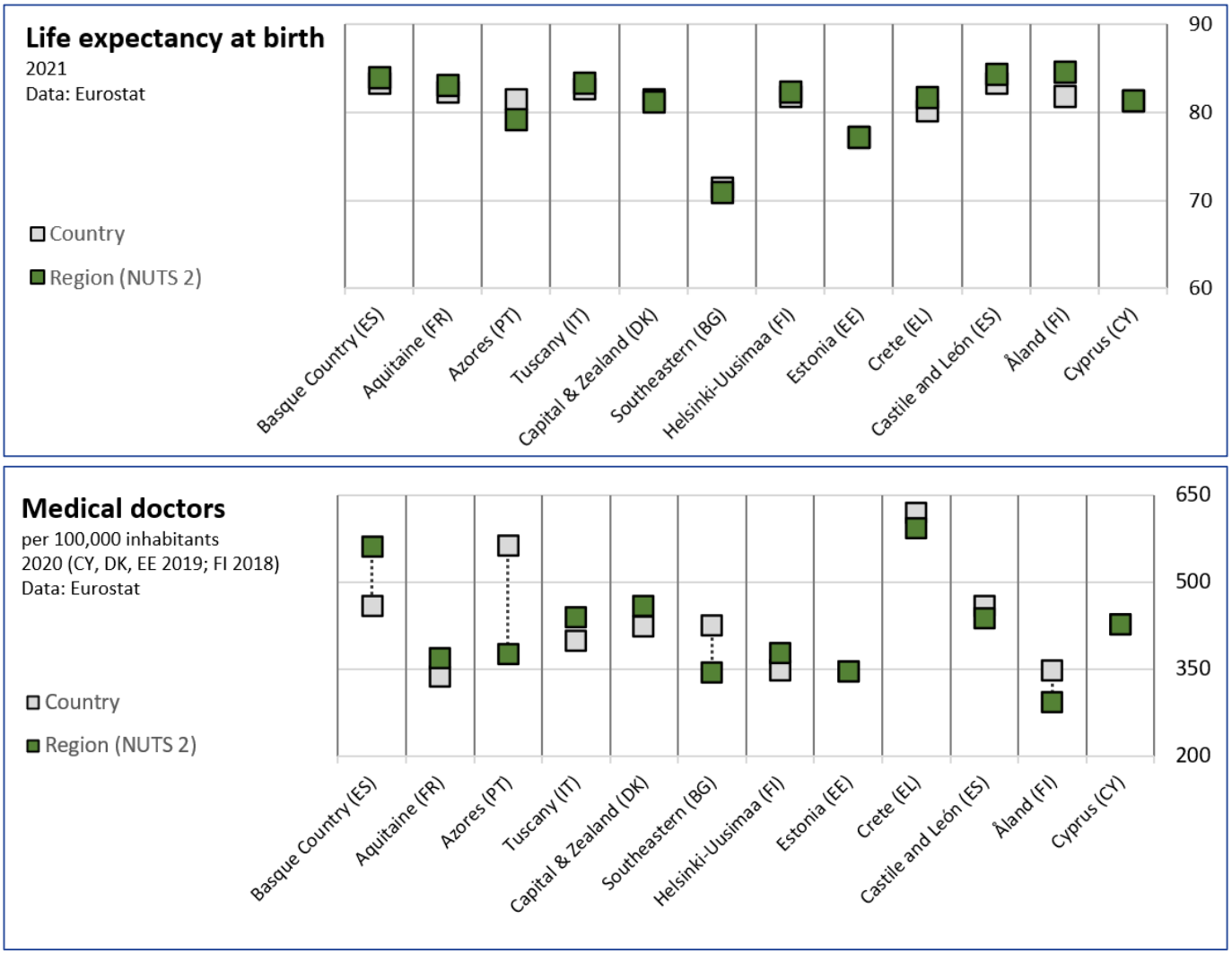

Figure 2.10 Life expectancy and medical doctors in R4C regions

Life expectancy in Southeaster (BG) is relatively low compared to the other regions. In terms of medical doctors per inhabitant, Åland (FI) has a relatively poor coverage. In the Azores (PT) and Southeastern (BG) numbers are higher, but considerably under their respective national average.

2.9. Voting and digital accessibility

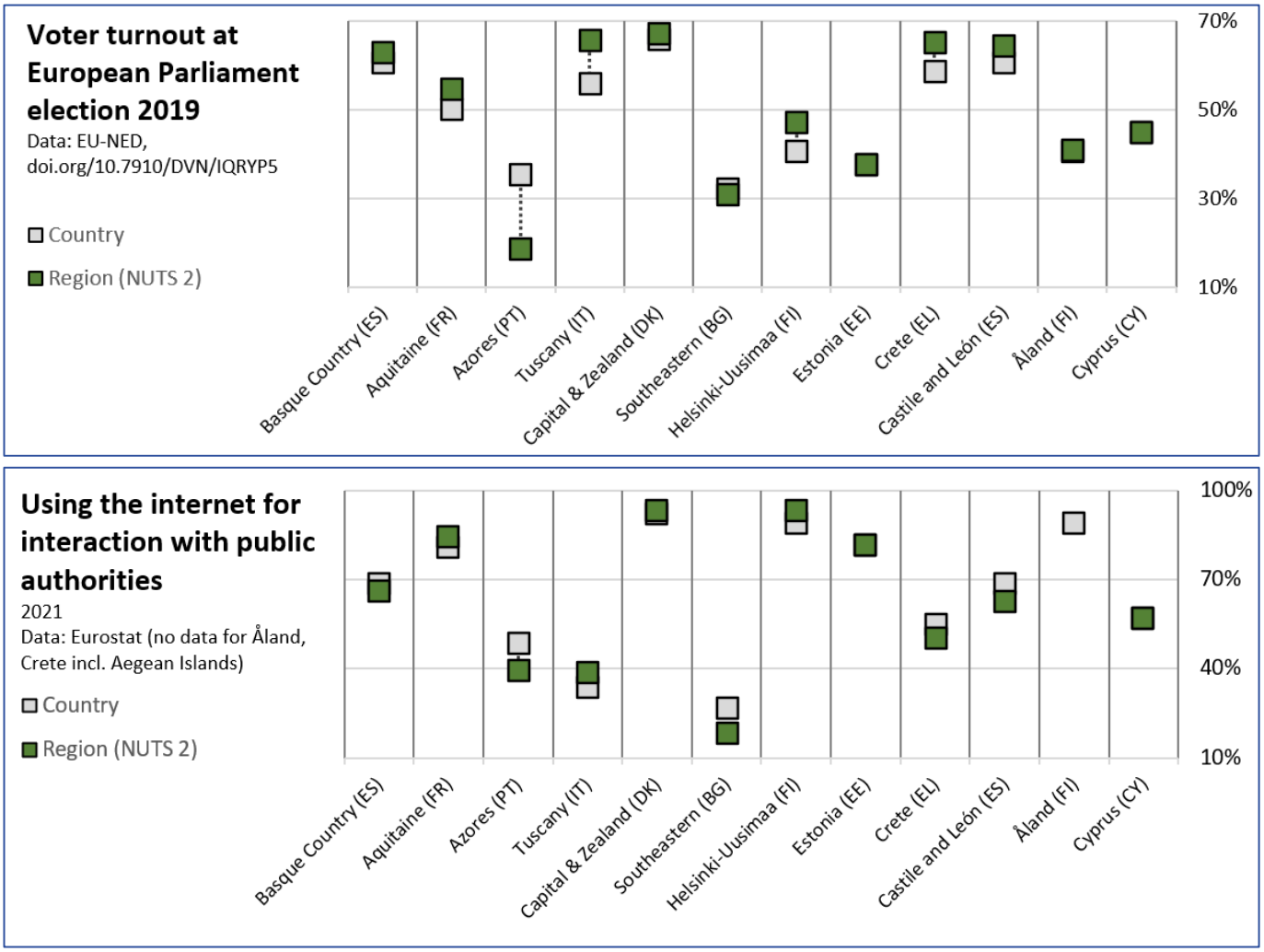

Figure 2.11 Voter turnout and online interaction with public authorities in R4C regions

Voter turnout at the last European Parliament elections was comparatively very low in Azores, also lower than in Portugal as a whole. Also, in Southeastern (BG), Estonia, Åland (FI) and Cyprus voter turnout was relatively low.

The share of people using the internet to interact with public authorities was lowest in Southeastern (BG). In general, there is a wide spread in this indicator with some regions reaching over 90%, but many others are only below 50%

2.10. Transport network

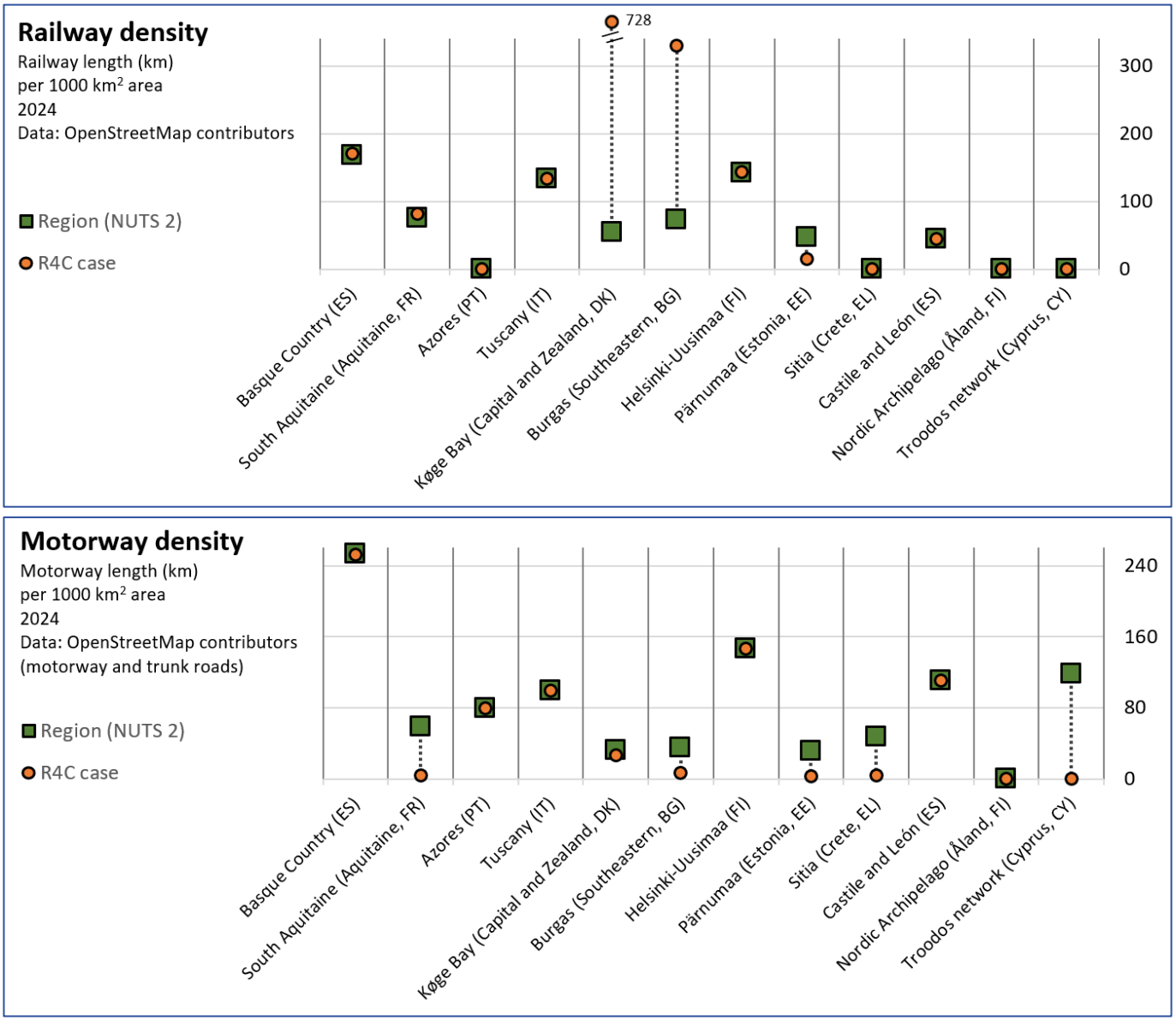

Figure 2.12 Length of motorway and railway infrastructure per area (km per 1000 km2)

Length of motorway and railway infrastructure has been extracted from OpenStreetMap, why we also have data on the spatial level of the cases. There are big differences in the extent of railway or motorway infrastructure in the regions. On NUTS2 level, Nordic Archipelago is the only region which has neither railway nor motorway. When we zoom further in on the cases (those which are smaller than the respective NUTS2 region), also Sitia and Troodos have neither railway nor motorway infrastructure on their territory.

Highest density of motorway infrastructure has the Basque Country, followed by Helsinki-Uusimaa. The two are also in the group with the highest railway infrastructure density. However Køge Bay and Burgas, outpace all other regions in terms of railway density when looking at the case level, while they are under average on NUTS2 level.

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2.11. Comparative summary of indicator analysis

Vulnerability is multidimensional (Lager et al., 2023). Age or income alone do not necessarily indicate a vulnerable situation. Table 2.3 provides therefore a brief overview across the indicators for each demo region. We highlight those where the regions had comparatively higher/lower values (following the rationale described in Table 2.2) than other regions or their respective countries. Where the table is empty, values have, comparatively, not been higher/lower.

We include both “present day conditions” (population, demographics, employment and income, poverty, education, health), and indicators informed by the hazards identified by stakeholders across the regions (agriculture and tourism, accessibility and public participation).

National context

When comparing the regional and national values across cases, we can see that differences between countries are usually much higher than difference between a region and its country. Part of the story is that many regions are rather large (NUTS 2) and therefore represent a significant share of the country. But it also shows that many of the selected indicators are strongly influenced by national policy and context.

Urban-rural differences

Not surprisingly, the regions are very diverse in size, population, geography (urban, rural, islands etc.). A comparison of social variables across countries with different settlement structures is tricky. However, we have 2 x 2 regions which are in the same country: Basque Country and Castile & León (both in Spain) and Helsinki-Uusimaa and Åland/Nordic Archipelago (both in Finland). In both pairs we have one more urban (the first one mentioned) and one more rural region (the latter). Ageing, education, employment in agriculture, forestry and fishing, and health services show differences in both pairs, whereas the rural region has a higher vulnerability. In single household the urban region has higher shares. The other indicators related to unemployment, poverty, tourism and participation seem less related to an urban-rural divide.

Singularities

It is worth noting values in some of the variables, where specific regions stick out.

- High population and infrastructure density and in Basque Country (ES) and Køge Bay (DK)
- High population decline in Castile and Leon (ES) and Southeastern (BG)
- High share of people with low education in Azores (PT)
- High share of people 70 or older in Tuscany (IT), Castile and León, and Sitia (EL)
- Very high tourist arrivals per capita in Crete (EL) and Åland (FI)
- High share of employment in agriculture, forestry and fishing and low participation in lifelong learning in Southeastern and Crete
- Low number of medical doctors per inhabitant in Åland
- High material deprivation, low life expectancy and low internet interaction in Southeastern

Single vs. multiple vulnerabilities

For some regions only a few indicators are of concern in a comparative view, while others stick out with comparatively low/high values in several indicators. Southeastern, the region in Bulgaria where Burgas is located, is one of the

regions with an unfavourable condition in several indicators, similar Azores (PT), Crete (EL) and Castile & León (ES). From a regional perspective, Aquitaine (FR), Capital & Zealand (DK), Helsinki-Uusimaa (FI) and Cyprus have the most favourable conditions.

Limitations to comparison

It is important to remember that the analysis is based different spatial levels, several on NUTS2 values. In the six cases where NUTS2 is bigger than the actual case area, there might be considerable disparities between sub-regions.

Especially for Troodos, the analysis is too generalising, as the Troodos network consists of inland rural municipalities, none of the bigger cities or coastal areas of Cyprus included.

With only 12 regions (out of several hundred in Europe) a general quantitative analysis has only limited validity. Also, the regional aggregates cannot be combined to directly conclude on individual situations facing multiple challenges. However, the comparative view on the 12 regions contributes with a better understanding of ranges of attributes relevant to social vulnerability.

Table 2.3 Summary of social vulnerabilities according to regional indicators

Case (NUTS2 if different)	CC	Population	Demography	Income and unemployment	Poverty	Education	Agriculture and tourism	Health	Voting and digital accessbility	Infrastructure
Basque Country	ES		High share of elderly	High unemployment (but lower than country)						High railway and motorway density
South Aquitaine (Aquitaine)	FR		High share of elderly							
Azores	PT	Population decline			High risk of poverty	High share of people with lower education levels and low adult learning	High employment in agriculture, forestry and fishing	Life expectancy below 80	Very low voter turnout at EP and low digital interaction with government	
Tuscany	IT		High share of elderly			High share of people with lower education levels			Low digital interaction with government	

Case (NUTS2 if different)	CC	Population	Demography	Income and unemployment	Poverty	Education	Agriculture and tourism	Health	Voting and digital accessbility	Infrastructure
Køge Bay (Capital and Zealand Region)	DK		High share of single households							High railway density
Burgas (Southeastern)	BG	Population decline		Low income (also lower than country)	High risk of poverty and material deprivation	Low adult learning	High employment in agriculture, forestry and fishing	Few medical doctors, life expectancy below 80	Low voter turnout at EP and very low digital interaction with government	High railway density
Helsinki-Uusimaa	FI		High share of single households							
Pärnumaa (Estonia)	EE	Low density	High share of single households					Few medical doctors, life expectancy below 80	Low voter turnout at EP	
Sitia (Crete)	EL	Low density		High unemployment	High risk of poverty and material deprivation	Low adult learning	High employment in agriculture, forestry and fishing. High rate of touristic arrivals			Neither railway nor motorway
Castile and León	ES	Low density, population decline	High share of elderly	High unemployment (but lower than country)		High share of people with lower education levels	High emp. in agriculture, forestry and fishing			
Nordic Archipelago (Åland)	FI	Low density	High share of single households				High rate of touristic arrivals	Few medical doctors		Neiter railway nor motorway
Troodos (Cyprus)	CY	Low density								Neither railway nor motorway

3. Narratives on vulnerable groups in climate plans and projects

3.1. Introduction and approach

In this section we present thematically structured narratives on social vulnerability across the regions. The narratives were gathered through a mini-survey among the regional stakeholders, a screening of climate (adaptation) plans and 12 online semi-structured interviews with regional stakeholders, one in each demo region (see Table 3.1).

The mini-survey included four open questions on vulnerable groups and climate hazards in the region. It was sent out to the main R4C local contact from each demo region and prior to the R4C kick-off meeting in early February 2023. Eleven regions responded. In two cases we got responses from two different stakeholders. A final question of the mini-survey regarded the availability of plans or strategies relevant for the topic (e.g. climate strategies, adaptation plans), which formed a starting point for the following interviews.

12 interviews were held between April and September 2023, one with each region. They typically lasted one hour. Interviewees besides the local R4C contact were chosen (if seen relevant) by the local R4C contact and included 1-5 people from 1-4 regional stakeholders. Interviews were held online (teams), recorded and transcribed (automatically with minor manual proofing). The group interviews followed a semi-structured guide. Occasionally internal discussion/clarification among interviewees took place.

The interview method was chosen because it provided us rather quickly with deep insights in the regions. When interpreting the results, our emphasis was on illustrating a range of topics and approaches across the regions rather than to conduct a comprehensive analysis of the single region. However, a bias towards the participating stakeholders cannot be prevented and will mainly address perspective from public authorities, like a regional government administration, which are the typical local R4C partners. Vulnerable groups might not be represented well enough, which we take into account for a critical reflection.

The interviews departed typically from one main plan or strategy the stakeholders have worked with. Using this approach, we were able to limit and focus the discussion of vulnerable groups to a specific topic, although the interviews were open enough to give space to other related matters.

It was not possible for us to evaluate the credibility of the plan or strategy discussed. However, we screened the plans beforehand for information on vulnerable groups. Also, such plans or strategies are usually in the local language. Therefore, we needed to work with a machine-translated version.

Table 3.1 Overview of qualitative data collected from R4C demo regions

R4C demo region	Mini-survey	Time of interview	Stakeholders represented at interview	Plan/strategy discussed	Project discussed
Azores (PT)	Ok	August 2023	Azores region (Regional Directorate of the Environment and Climate Change, Regional Fund of Science and Technology), University of Azores	PRAC – Regional Program for Climate Change (2019) and some related other plans/strategies	Citizens and stakeholders' literacy
Castile and León (ES)	Ok	September 2023	Junta de Castilla y León, Cartif (tech. partner)	Directrices para la adaptación de la gestión del patrimonio natural y la política forestal al cambio climático en Castilla y León (2022)	Pilot farm in Segovia
Basque Country (ES)	Ok	July 2023	IHOBE (public env. Society of Basque gov.), Tecnalia (tech. partner), Zabala (innovation consultancy)	Climate Change Strategy of the Basque Country to 2050 (Climate Change and Energy Transition Plan 2021-2024; draft Energy Transition and Climate Change Law of the Basque Country)	Restoration actions of the Txingudi estuary
South Aquitaine (FR)	Ok	July 2023	Communaute Pays Basque, SUEZ (technical partner)	Local Coastal Risk Management Strategy	Adaptive use of the waterfront based on real time risk knowledge (IP1), Long term coastal defense strategy (IP2)
Tuscany (IT)	n/a	May 2023	Tuscany region, Municipality of Piombino, Scuola Superiore S. Anna di Pisa, IRIS and NEMO (consultancy)	2030 Agenda Tuscany	Coastal erosion project around Piombino
Køge Bay (DK)	Ok	July 2023	Capital Region, Region Zealand	DK2020: Implementing Climate Action Plans (CAP) in almost all municipalities	Building social wellbeing and resilience (IP B)
Nordic Archipelago (SE/FI)	Ok	August 2023	Nordic Archipelago cooperation secretariat		Habitability and living conditions
Helsinki-Uusimaa (FI)	Ok (two resp.)	May 2023	Helsinki-Uusimaa Regional Council, Forum Virium (City of Helsinki innovation company)	Regional Climate Roadmap Helsinki Climate Actions, smart mobility projects	Human-centric digital twin model for actionable adaptation
Pärnumaa (EE)	Ok (two resp.)	April 2023	Pärnu City, Pärnu County	SECAP Region, SECAP City	Development tools to mitigate heat islands and impacts of erosion

R4C demo region	Mini-survey	Time of interview	Stakeholders represented at interview	Plan/strategy discussed	Project discussed
Burgas (BG)	Ok	June 2023	Burgas Municipality	Plan for Integrated Development (PIRO)	Local Climate Resilience Group (part of IP3)
Sitia/Crete (EL)	Ok	July 2023	Demokritos (tech. partner), Sitia Municipality, University of Crete	Crete regional climate adaptation plan from 2021	Maintaining local traditions and ways of life under climate change (IP2) Water scarcity, citizen participation and open innovation (IP3) Prevention and education
Troodos network (CY)	Ok	May 2023	President of the Troodos network, Cyprus Energy Agency (NGO)	Troodos Strategy	Developing the pathway for converting Troodos into a model for a Climate Neutral, Inclusive and Regenerative Tourist Destination

3.2. Groups recognised as socially vulnerable

Mini-survey: Groups affected by climate change

In the mini-survey, conducted in January/February 2023, we asked which social groups the R4C partners identify to be affected by climate change. We did not specifically ask for “socially vulnerable groups”, to keep answers more open in that early stage of the task. The answers included a wide range of groups. Groups mentioned in at least four different regions were:

- Citizens living at the coast (or generally by the water)
- People working at the coast or in coastal related businesses (e.g. tourism)
- Farmers / people working in the agricultural sector
- Elderly (often mentioned in relation to vulnerability to heat waves)
- Population with lower income or socio-economic status

Other groups also mentioned included people in the tourism sector, in public works, in cultural heritage, in emergency and rescue jobs, people practicing water sports, students and children. Vulnerable people in general and also the society as a whole was mentioned. Following the IPCC definition of vulnerability (see Table 1.1), we should differentiate between two main categories:

- **Exposed sectors and groups** due to presence in places that could be negatively affected. In this case, the groups as such are not vulnerable, but due to their location in a specific site (like the coast), they are exposed to potential hazards.
- **Vulnerable sectors and groups** – vulnerable due to the characteristics of the economic activity or the social/individual condition.

Exposed sectors and groups (spatially vulnerable)

Following IPCC (see Table 1.1), **exposure** reflects "[t]he **presence** of people; livelihoods; species or ecosystems; environmental functions, services, and resources; infrastructure; or economic, social, or cultural assets **in places and settings that could be adversely affected".**

When asked to identify vulnerable groups within the demo region, many stakeholders turn to 'spatial argument', defining vulnerable groups in terms of their geographical exposure to climate related hazards. A stakeholder from South Aquitaine formulated the following list when asked to denote vulnerable groups in the demo region:

> *"The private property owners and the coastal workers. Most of the professionals that work on the coastline or near the coastline. And then you get a bunch of public infrastructures […]. And then guess I can say also maybe another community is the tourism or tourists because it's highly touristic and it's also so a coastline which is which is very which is visited." (Interview South Aquitaine, 0:26 h)*

These are groups that are spatially exposed to landslide and marine flooding, two major hazards in the demo region. The groups are classified as vulnerable due to their exposure, to the hazard in question. An example from the Azores reflects how consideration to vulnerability have been implemented.

> *"So what we have been doing is to build infrastructures that reduce these floods in the cities, in the places where people live. And with that, we are looking for groups that are more vulnerable in these areas. So we look at vulnerable groups according to the territory and not according to the age or the status social status." (Interview Azores, 0:12 h)*

Here, the consideration of territory is very explicit, while considerations on social vulnerability is left out of the question.

Vulnerable sectors

Following IPCC (see Table 1.1), **vulnerability** addresses "[t]he **propensity or predisposition** to be adversely affected. Vulnerability encompasses a variety of concepts and elements including **sensitivity** or **susceptibility** to harm and lack of capacity to cope and adapt."

Throughout the interviews both vulnerable groups and vulnerable sectors were highlighted. One of the often-mentioned sectors, considered vulnerable to climate change, is agriculture. A sector that has an important socioeconomic role in many of the demo regions.

> *"In total 13 sectors have been studied under vulnerability towards climate change. The most important one was agriculture and livestock farming, since it's one of the most important employment sectors in the area, followed by tourism and also biodiversity and cultural heritage." (Interview Sitia, 0:07h)*

In Crete the vulnerability of the agricultural sector is, particularly viewed as related to water scarcity:

> *"The water scarcity is an issue because there are - maybe there are 1 or 2 years that you don't have a good crops. [No] good crops means that you don't have a solid income. So this is also some, a compounding factor, for what we are discussing." (Interview Sitia, 0:36h)*

A similar issue was commented by a stakeholder in Castile and León:

> *"[T]raditionally agriculture here in Castilla y León has been crops that do not require extra water or extra watering. And now, of course, because of climate change and because of the water scarcity, because it doesn't rain, they have to change to crops that might need watering constantly. And again, there is no infrastructure for that. So it becomes even more expensive to maintain these crops." (Interview Castile and León, 0:19h)*

Vulnerable groups

In the discussed plans and projects, vulnerable groups are, if at all, often only very generally mentioned. We have not met a clear definition, however, typically elderly and children or those with low income or socio-economic status are mentioned broadly. In different more specific projects or from experience, several interviewees mentioned more concrete groups or settings.

> *"Mostly deprived people in areas with low-income capacity which are less educated, elderly people above 65 already retired people, people with disabilities, energy poor people, and the Roma minority as well. We have specific programs that target these vulnerable, socially vulnerable groups." (Interview Burgas, 0:31h)*

> *"Men and women are both effected, but in different ways." (Interview Castile and León, 0:46h)*

> *"[N]ursing homes, elderly people, kindergartens, hospitals" (Interview Køge Bay, 0:12h)*

Rural and less populated areas are under the double pressure of climate change and urbanisation, as indicated by a stakeholder from the Nordic Archipelago:

> *"… farmers and the agriculture, forestry. Livelihoods are in, perhaps not in danger, but they have really big challenges and demands. And this is not only in the Archipelago area. We are talking about the countryside overall. [...] We need to have food and we are not sure if young people would like to continue with that." (Interview Nordic Archipelago, 0:42h)*

Emerging groups

In the interviews, stakeholders were asked if they see a development in vulnerable groups, some new vulnerable groups emerging. Many stakeholders listed migrants and the vulnerability of future, incoming citizens:

> *"[I]mmigrants and people representing different ethnic backgrounds. People are moving from different places of the world to Helsinki, like all the time. And definitely this group and elderly, of course. It's a smaller city as well, but segregation is also a question that might be more topical in the future because it's getting worse." (Interview, Helsinki-Uusimaa, 0:54h)*

Another general observation, is the issue that those who are already vulnerable, may be even more vulnerable in the future to come:

> *"The already vulnerable groups are becoming more vulnerable since they're not aware that they are. So they are also not preparing for the upcoming crisis." (Interview, Pärnumaa, 0:54h)*

Summary and insights

A range of groups have been mentioned by stakeholders to be vulnerable. This includes those related to age and demography but also those related to their job, where climate change can affect working conditions. Also, the sectors depending on natural resources as agriculture and tourism have been mentioned many times.

Table 3.2 is a simple summary and categorisation of the types of groups often understood as socially vulnerable groups. The exposure perspective (sometimes also called 'spatial vulnerability') is separate from the vulnerability following the IPCC definition. However, in the regions' practice there is often no particular distinction made. The table can help clarifying that.

It is recommended that the regions make a clearer distinction between exposure and vulnerability. In addition, the distinction between vulnerable sectors and vulnerable groups is useful as sectors and groups operate at different tiers of regional policy and practice and may call for different response strategies. As an example, the impacts of climate change on the tourism industry in e.g. Crete might have cascading societal effects beyond the impacts on a particular vulnerable group such as the elderly. Hence, the prioritization of efforts can be specified by adopting this distinct categorisation of social vulnerability.

Table 3.2 Type of groups

	Economic sector	**Social group**
Exposure perspective	*Example: Tourism businesses at the coast*	*Example: Residents at the coast, threatened by sea level rise or storm surges*
Vulnerability perspective	*Example: Farmers/agriculture because of water dependency (and scarcity)* *Example: Tourism sector in general because of changing climate*	*Example: Elderly with less (socio-economic) resources (e.g. technical installation, rural retreat) to cope with heat waves*

3.3. Visibility of socially vulnerable groups in plans and strategies

Consideration towards socially vulnerable groups in regional climate adaptation and mitigation, may find expression in different forms. By examining regional climate adaptation and mitigation plans, and strategies selected in collaboration with R4C partners, we note different degrees of attention to the topic. In addition, strategies and experience among regional stakeholders have been collected though the semi-structured interviews, exploring the narratives behind, more or less explicit, consideration of socially vulnerable groups throughout the plans. Neither the plans examined, nor the stakeholders interviewed, provide an exhaustive list, but rather a list of examples of current status quo approaches and narratives.

Topic recognized

A variety of the plans examined and discussed with the stakeholders, mentions consideration of vulnerable groups, in one form or another. It may be as part of the overall aims of the plan, e.g. in the recent *Climate Change and Energy Transition Plan 2021-2024, for the Basque Country*, where it is explicitly stated as an objective, for the plan to *"supporting the most vulnerable groups" (p.4).* In the forthcoming law on "Energy Transition and Climate Change" of the Basque Country, socially vulnerable groups are specifically mentioned to account for in adaptation processes:

> *"This entire process must be carried out under the criteria of a just transition that has into account the equitable distributions of the costs and burdens derived form it, without leaving nobody behind, paying special attention to the economic sectors, territories and most vulnerable population, integrating the variable of gender, age or dysfunction of the people, so that the transition does not become a new cause of injustices and inequalities." (Law on Energy Transition and Climate Change, Chapter VII, p. 10, translated with google translate)*

It may be as part of the assessment and analysis, as in Burgas' *Sustainable Energy and Climate Strategy and Action Plan 2021-2030,* where vulnerable groups (the plan refers to a definition by The Covenant of Mayors) and vulnerable sectors are identified in relation to specific climate hazards, as part of a *"Population Impact Assessment"* (p.94-98, machine translation). Or through a vulnerability and risk assessment prepared for a specific project, as exemplified in relation to the upcoming R4C intervention at Txingudi Bay, as commented in the interview by a regional stakeholder in the Basque Country:

> *"[T]he vulnerable groups have been taken into consideration in the vulnerability and risk assessment with specific indicators […] like age of the population […] and then the economic resources of the different […] I mean the more exposed municipalities but also the more vulnerable has been prioritized in the action of the climatic policies of the Basque country." (Interview Basque Country, 0:33h).*

Topic under development

In the discussed plans and projects, vulnerable groups are, if at all, often only very generally mentioned. We have not met a clear definition, however, typically elderly and children or those with low income or socio-economic status are mentioned broadly. A majority of stakeholders interviewed commented, that considerations on socially vulnerable groups in relation to climate adaptation is still a relatively novel topic for both municipal and regional climate adaptation planning. As formulated by a regional stakeholder from Køge Bay, Denmark:

> *"A lot [of the municipalities] are barely looking at [the topic of socially vulnerable groups] very deeply. It's very new for the municipalities that are not used to it." (Interview Køge Bay, 0:12h)*

While the topic is not necessarily incorporated into climate adaptation plans and strategies, as exemplified by a stakeholder in Sitia:

> *"… in these reports […] specifically the definition of vulnerable groups is not mentioned." (Interview Sitia, 0:07h)*

Or, as amplified by a stakeholder in the Azores:

> *"I don't think this dimension of vulnerable groups in this kind of politics is addressed not in the Azores or in the mainland. Of course, the vulnerable groups that we know that will always be first impacted are*

> *usually the low income groups and the older people that we know. But it's not like we, um, it's not like, like there's an identification of the vulnerable groups." (Interview Azores, 0:08 h)*

Still, awareness and intentions may be present. In Pärnumaa's regional Sustainable Energy and Climate Action Plan (SECAP) it is explicitly mentioned that vulnerable groups are not assessed:

> *"The impact of climate change on the most vulnerable groups in the local community have not been assessed. […] There are no plans to reduce the vulnerability of the most vulnerable groups regarding the impacts of climate change." (Pärnu County SECAP 2030, p. 14).*

An explicit statement such as this, brings forth the considerations on vulnerable groups, and can be a first step to incorporating assessments and plans in upcoming revisions. The process of this SECAP was led by a technical partner, and when addressing the question of why these assessments were specifically pointed out in their absence, a regional stakeholder pointed towards the newness of these considerations, while simultaneously reflecting on the learnings from one plan process to the next:

> *"I think [the impact of climate change on the most vulnerable groups] is definitely something which came in later. […] after the presentation of the SECAP results, it came out that there are a lot of stakeholders who have not been included in this process and in the future they will need to be included more so. Maybe it was an oversight or maybe the person preparing the SECAP was assuming in a way that the municipalities know their vulnerable groups and they are speaking for them." (Interview Pärnumaa, 0:27h)*

Topic treated elsewhere

Exploring the different narratives on how, and why (or why not) socially vulnerable groups are mentioned in plans and strategies, there was a tendency that socially vulnerable groups were thought of as something closer related to, and dealt with, by different governance sectors than climate adaptation. Hence, the issue may be addressed elsewhere in the regional administration, as in the example mentioned by the regional partners in Sitia, Crete:

> *"Crete has a specific problem about social welfare and social integration for the vulnerable, specifically for the vulnerable population. And they have funding and specific projects for this. But they are not related explicitly to the climate adaptation." (Interview Eastern Crete/Sitia, 0:42h)*

The stakeholder exemplifies the effects of that approach, with the following example, from the crisis of a recent flooding:

> *"They had specific measures to save [vulnerable groups] in case of emergency. But this is something different from being explicitly mentioned in the climate adaptation plan." (Interview Eastern Crete/Sitia, 0:42h)*

The absence of explicit considerations of socially vulnerable groups from plan of strategies, may also be explained by that knowledge of these groups, and hence maybe considerations towards them, is thought of as somewhat common knowledge in the local administration/community. As the following quote from Cyprus illustrates, that while the topic is not explicitly recognized in a plan of strategy, implicit knowledge ("we knew") may still be present.

> *"[Socially vulnerable groups] weren't really identified as part of the plan, apart from the fact that there was the identification that certain villages have a very ageing population. [...] in some cases we knew*

which villages had underemployment or they were not fully employed, which obviously has issues." (Interview Troodos, 0:17h)

Summary and insights

By examining examples of climate adaptation plans and strategies and interviewing regional stakeholders exploring how socially vulnerable groups are visible in plans and strategies, we found that the narratives are both mixed and complex. Considerations of socially vulnerable groups are, in multiple cases understood as a 'new topic', a line of initiative that is developing. While considerations on social vulnerability are not necessarily associated with climate adaptation, and hence allocated to different governance sectors. Finally, the problematisation of the relationship between long term abstract strategies and real time 'emergency situations' was brought forth.

The integration of socially vulnerable groups into regional climate adaptation planning is meaningful and in alignment with the overriding international goals to avoid unequal burdens and ensuring that no one is left behind. Moving forward, social vulnerability should be strengthened in regional climate plans. This calls for closer coordination and collaboration between climate change planning professionals and social security service providers at the local and regional levels, and possibly also at the national level.

3.4. Approaches to involving socially vulnerable groups

Through the interviews we examined approaches to involving socially vulnerable groups in the process of plan making and project implementation. As both region and context have great variety within R4C, so do the replies and narratives we encountered. In the following, we bring a series of example on how regional stakeholders experience, narrate, and understand the involvement of socially vulnerable groups.

In site-specific projects

When addressing involvement more broadly, a stakeholder from Tuscany exemplified a successful involvement process, which due to the length and local engagement turned out successful:

"The ground was ready because of this process that started a few years before. Thanks to [local stakeholder] and his view of how to prepare these people. […] So when we started to design and to realize the project […] all these people, they were already ready and they were confident of what type of nature-based solution we were realizing. So, they started to understand, and they started to be part of the game and to explain to their hosts, to […] tourists, what type of intervention we are doing. They spread the word." (Interview Tuscany, 0:19h)

A stakeholder from the Basque Country likewise emphasized the role of lengthy involvement. Through the years interventions in the R4C demo region have been carried out and through these an engagement from, and attention to certain stakeholders have developed:

"Interventions in [Txingudi], they started in the 80s. So there is already a kind of a history of different groups demanding information or just complaining or just wanting to participate. And so when identifying stakeholders, of course we follow this influence interest matrix. As traditionally. But then we know that for these activities that have been carried out in the area in the past, we know which groups have made consultations. […] So they are well identified." (Interview Basque Country, 0:27h)

As expressed through the quote, the long involvement process can be part of establishing a certain power dynamic in the representation, repeating the voices of those who have traditionally been heard, the well-defined stakeholders.

Representation

When addressing the topic of socially vulnerable groups more specifically, we generally met experience with both representation and direct involvement of most (mainly) specific groups. A Bulgarian stakeholder exemplified how a specific group may be involved for a specific plan topic:

> *"For example, people with disabilities, we always invite them to public consultations or for the Sustainable Urban Mobility Plan. We send them the action plan with the identified measures to revise, to comment and to collect their input. And they are also represented by organizations and foundations that work with them. That's one example that comes to mind." (Interview Burgas, 0:32h).*

From French stakeholders, the representational role of the elected representatives was brought forth:

> *"So even if there is no direct discussion with the general audience, these elected representatives are leading the voice for the local citizens and the different requirements and worrying that they could have. (Interview South Aquitaine, 0:18h)*

The involvement process may take more informal approaches, relying slightly more on the initiative of the individual to join open discussions, when asked if vulnerable groups are being heard or represented in any formal or informal way, as exemplified in the Cypriot region:

> *"[T]here was open discussions in big villages all around Troodos and they could be there. They didn't have any association to represent them." (Interview Troodos network, 0:20h)*

Developing involvement

As with the topic of considering socially vulnerable groups in climate adaptation in general, there are also signs across the regions of increased attention to involvement more broadly. In the Basque Country, Spain, a newly proposed law may promote the agenda:

> *"There have been trials of like citizen participation, etc. But there is no legal binding structure for that, I think. Now, the new law [...] contemplates a citizen assembly. Well, as you know, for energy transition laws, etc., whereas it's not binding, it has a legal structure to propose recommendations to politicians and policy makers. And then at least they have to respond to this and try to integrate these recommendations, implement them." (Interview Basque Country, 0:47h)*

While legal structure can promote a general agenda, the format of the specific involvement will often need to adapt to the specific context, as pointed out by a Bulgarian regional stakeholder, with reference to the Roma minority and elderly respective, two socially vulnerable groups in the respective context:

> *"[F]or each group, we need to adapt the communication tools because, for example, with the with the Roma minority, they are hard to approach individually, but they work with their own community leaders. So if we communicate with the leader, they invite them and they participate […]. And it's the same with the elderly, people who communicate the old school ways, or they don't use social media or they don't*

follow the news online. So, we have to contact directly with the leaders of the local community centres and the pensioner groups that they're members of." (Interview Burgas, 0:51h)

Challenges in involvement

Throughout our interviews, concerns regarding the challenges of including socially vulnerable groups in regional climate adaptation were also raised. One line of comments related to the experienced abstractness of climate change and climate adaption, and hence the difficulty of arguing the pressing relevance for engagement in these issues, as a regional stakeholder in Burgas phrased it:

"[The Roma minority], their field of interest is a lot more different than this. And it's very tough when you explain such global issues like climate change to people that really fear for their everyday living. So this is an issue that has to be solved and we try to organise a lot of campaigns." (Interview Burgas, 0:42h).

From a different stakeholder in the Burgas region the issue of maintaining engagement over time, was phrased as follows:

"[T]he biggest challenge for us as a municipality is not only to involve these groups, but also to keep them collaborative and active through the entire process keep this consistency, because sometimes they come up and show up at meetings. Other times they just we don't touch base for some time. So this consistency, it's a main challenge." (Interview Burgas, 0:58h).

And while engagement has its challenges, the topic of adaptive capacity, which is not systematically treated in this deliverable, was also mentioned. As a regional partner from Castile and León, remarked:

"[T]hey are not very likely to change because they are old people. So they are aware, but they don't know how to adapt to the climate change." (Interview Castile and León, 0:57h)

Summary and insights

Throughout the interviews, we found general awareness to, and experience with citizens involvement in planning processes. The attention on directly involving socially vulnerable groups varied. We identified different experiences with involvement and, while some involvement processes were explicit and systematic, others were implicit and informal, and/or through concrete site-specific projects. The involvement could occur through hearings (physical or online), direct involvement, through organizations, or represented by the publicly elected. Generally, we found an increasing focus on involvement and a certain awareness of involving socially vulnerable groups, still challenges relating to both the engagement, the maintaining of interest and the adaptive capacity of vulnerable groups were addressed.The interviews indicate a gradual maturation of engagement strategies ranging from site-specific consultation and trust building through proxy representations to more thorough and targeted participatory processes that empower socially vulnerable groups. In the process of building climate resilience and supporting just transition, it is relevant to fit the local context as a start, but also to progressively aim at higher levels of empowerment of socially vulnerable groups. It is not necessarily easy, but the willingness to 'stay with the trouble' is a pertinent issue.

3.5. The role of spatial and temporal scales

The spatial scale differs across the R4C partner regions, and so does the extent of the interventions. Through the round of interviews, we met variations of narratives on the role of scale in involving and recognising socially

vulnerable groups in climate adaptation processes. Some highlight, that a small-scale local focus can provide more intimate and case specific involvement. However, in large-scale, long term and often abstract climate adaptation projects, involvement at a regional scale poses difficulty in engagement.

Small scale (local / short time frame)

For regions that have a smaller spatial extent, the line of command, and the distance between citizens and decision makers is often shorter. This poses some benefits in terms of a more intimate relation. This perspective was exemplified in the Troodos region, where involvement is experienced as less of an issue:

> *"So basically, because the Troodos region is small and they all know each other there these issues of imbalance and power imbalances didn't come up as much because, you know, like they're just like neighbours there […], it's hyperlocal. So, it wasn't as if some voices were drowned out or, you know, they felt that they weren't able to put their vision or their worries or anything forward". (Interview Troodos Network, 0:15h).*

While there is the experience that 'no voices are drowned out', there could be a risk that the less formal and hyperlocal setting supports established power dynamics in a certain context.

In terms of engagement, a stakeholder from Basque Country highlighted the ease that comes with the small and intimate scale, while simultaneously pointed out the challenges of the abstract regional level:

> *"The closer the consultation process is at the local level in a district for instance, is very easy to get in contact with the citizens and the individuals. But in processes as big as the regional strategy is very difficult to get involved individuals. So it's always on many occasions through organisations. " (Interview Basque Country, 0:51h).*

In this perspective, the engagement of the individual is related to the local scale, while the involvement at the regional level is structured through representational organisations.

Large scale (regional / long time frame)

Along those lines, a stakeholder from Køge Bay added to the scale issue, by also raising the issue of the complexity of the subject matter, in climate adaptation.

> *"I think a lot of municipalities they've had a bit of issues or problems with involving a lot of citizens in this very big, broad strategic, long-term plan. Whereas it's much easier for them to involve citizens when they're doing actual 'områdeplaner' like area plans or concrete projects." (Interview Køge Bay, 0:08h).*

Likewise, in South Aquitaine, the issues of the larger scale were raised:

> *"it's quite difficult and it takes time also and maybe it's easier with a smaller project. And we prefer do this consultation with a smaller project." (Interview South Aquitaine, 0:16h)*

A stakeholder from Helsinki-Uusimaa also noted the issue of dealing with complex matter in a limited amount of time.

> *"Of course, what happens is that you can't go too deep into these questions because in the end you have so much in the table. […] internally it helped us to combine our processes and sort of work together in a cross disciplinary manner." (Interview Helsinki-Uusimaa, 0:11h).*

In terms of involvement of socially vulnerable groups, the level of abstraction, and long-term nature of climate change adaptation pose an even greater challenge, and may require a specific type of attention and types of tools, as highlighted by a Basque Country stakeholder:

> "*[S]ome of the groups that may be more vulnerable or more deprived won't be easy to engage, we need to somehow break this barrier between the short-term priorities that they may have now and the long-term priorities, climate adaptation is a long-term challenge. So somehow, the idea is to make this tangible through different tools, like to make them know which can be the consequences and the audience for this adaptation so they can also contribute to that." (Interview Basque Country, 0:32h)*

Summary and insights

Through most of the demo regions, we found examples and comments revealing that in terms of involvement, the regional level is often too abstract. Handling complex issues at the regional scale and engaging citizens is generally experienced as challenging and resource demanding. For vulnerable groups, the abstract and long-term implications of climate change and climate adaptation may seem even more irrelevant in relation to other issues. The positive narrative on involvement at a large, regional scale seem scarce, whereas multiple examples were brought forth at the local scale.

It is recommended that the R4C regions acknowledge the difference between specific short-term local initiatives and long-term regional projects, reflect on the potentials and limitations of each approach, and consider how short-term actions involving socially vulnerable groups at the local level can work in tandem with the process of fostering climate resilience long-term.

3.6. The role of different stakeholders

Across the regions, stakeholders will play different roles, generally, and in relation to involvement and recognition of socially vulnerable groups specifically. Below we have collected a series of examples of how the role of different stakeholders are experienced and understood, in relation to the involvement and recognition of socially vulnerable groups in climate adaptation.

National government

At a general level, a regional stakeholder from South Aquitaine, pointed towards the central role of the national state level, in terms of formulating climate adaptation strategies, a process to which the 'general citizen' is not involved. The role of the general citizen in this case, is rather discussing readymade strategies prior to implementation.

> *"In the decision or in the selection process, the general citizens are not included, not to upstream at least. Then when 1 or 2 possible strategies are selected [at national level] most of the time, the elected people and all the local authority are discussing this or presenting this to local people and there is a kind of a discussion, to assess how this can be accepted by the local citizens, of course." (Interview South Aquitaine, 0:41h)*

In the French demo region, an example of a vertical hierarchy in relation to formulating strategies was expressed. In this example, the line of decision was unidirectional, moving from the national level, down and out to the local level. In Køge Bay, a regional stakeholder brought forth an example of a less direct line of decision making. In developing the project of Strandparken (Køge Beach Park, part of the R4C intervention), a later involvement from the national state, altered ongoing processes and drew the attention from the municipalities away from the regional level and back to the national level:

> *"Regarding Strandparken, there was a national involvement - right now maybe on hold - but when that started happening, we could definitely tell that we also had a collaboration between the region and those municipalities and it was hard to get them engaged because now they had the state's attention." (Interview Køge Bay, 0:49h).*

Indicating that in this situation, the power and attraction of the state's attention can overrule that of the regional level, be it due to resources competences.

Regional government

Still, while the national state level may be central in drawing the general lines in most of the cases, and may be able to, both formally and informally to overrule the regional level in many of the cases. The role of the region can still have a central role to play in terms of promoting recognition and involvement. A regional stakeholder from Castile and León highlighted the influence of regional strategies towards specific groups, as influential in formulating project objectives, and directing the focus for involvement and recognition.

> *"When the project [intervention for R4C] was developed at the beginning, there was a strategy from the regional government to enhance the rural woman in the region to promote maybe the entrepreneurs or jobs and something like that. But, this action now is stop finishes this year. So one of the parts that we want to address is how to provide this aspect in the project. But, the strategy has finished." (Interview Castile and León, 0:35h)*

The power of the regional level can very well vary within the region, depending on the resources and tradition of the specific municipalities. In the case of Køge Bay, a regional stakeholder commented that the largest and most resourceful municipalities in the Copenhagen region have less incentives and less tradition for engaging themselves in the regional planning initiatives, including DK2020, an initiative to support the development of local climate plans:

> *"They're like, 'We have the resources, we have big municipalities, we can do it ourselves.' So they don't really need [the regional council] or DK2020. Whereas the other municipalities down south have gone into [DK2020 plans] with a much more open mind and maybe also made much better plans, I would say." (Interview Køge Bay, 0:46h).*

Interest organisations

The influence of specialists, or lobby organisations, may additionally have a strong voice in deciding who has a say in formulating climate adaptation strategies. With reference to two public expertise offices in the French demo region, a stakeholder commented:

> *"It [the two offices] is public expertise, public experts. And they make a lot of lobby with the national government, with the French government. So sometimes it's also difficult". (Interview South Aquitaine, 0:39h)*

While another stakeholder seconded that in the end the decision on formulating the local strategies is a local decision, with the final mandate held by the locally elected representatives:

> *"But, at the end, it's a local decision, its local elected." (Interview South Aquitaine, 0:40h)*

A stakeholder from Spain additionally pointed towards the role NGO may take in formulating the projects, being placed as main stakeholder:

> *"Yeah, [NGOs, e.g. Ecologistas en Acción] are kind of, I'm not saying if big is the word in Spain, but I'm sure at least they are very involved in all these governance actions that the Spanish government takes at regional level. For example, if they say you can't do this because this is a protected area and we're not going to let you do this even if you want to do these kind of things." (Interview Castile and León, 0:12h)*

Funding bodies

When asked about the incentives for involving socially vulnerable groups in plan making, a stakeholder from Finland pointed towards the role that grant agreements may take:

> ***"****Maybe because it's written into the grant agreement or the project plan that you have to concentrate on accessibility and disability, for example, or that one is a project for, for young people […] But, it's not any like an official line that you have to choose." (Interview Helsinki-Uusimaa, 0:40h)*

Individuals

While official government bodies, organizations and funding bodies may play a central role in formulating who gets involved in plan making, the initiatives of individuals may also create its own local power dynamic, as exemplified by a regional stakeholder in the case of Sitia Greece:

> *"It's one person that started this big effort, but then the local community and for example, fishermen or farmers or other people that are affected by climate change and what is happening to the environment, they reach out to him and then it's like a chain of information. And the local authorities also trust him a lot and need his support in relevant issues and also consult with him for policies and for actions that need to happen." (Interview Sitia, 0:17h)*

Summary and insights

The regions within R4C form a heterogeneous group, with different cultural history, governance structures and spatial extent. The role different stakeholders play across these regions are closely related to the specific regional context, and even within the regions, the role of various governance levels can vary. Requirements set by funding bodies can steer the focus of specific involvement processes, while Individuals with authority can play an important role in a specific local context.

Mapping local governance structures is a relevant starting point for the regions to reveal power relations and historical path dependences. This knowledge helps identifying potential leverage points for change and hence, it informs prioritisations and decisions regarding social vulnerability and climate change action.

3.7. Drivers and narratives behind involvement/recognition or the absence of it

In addition to the above-mentioned categories, multiple additional narratives behind who, why and when involvement and recognition occurs, were brought forth during our interviews. Perspectives on how it may develop in the years to come, were also imagined from various stakeholders. In the following we bring a few examples on the themes we found more represented.

A growing topic

On the topic of raising awareness, and making professionals and citizens aware of the need and relevance of including vulnerable groups in climate change adaptation, many stakeholders expressed that it is an issue that they are just beginning to address, as a regional stakeholder in Estonian Pärnumaa pointed out,

> *"We are at the very beginning in a way, and just, you know, skimming the surface and probably, you know, within the next five years, we are going to discover a lot of things for us which we, you know, are currently not aware of." (Interview Pärnumaa, 0:55h)*

Hence, the potential for developing best practice and the need for peer learning is great. As another stakeholder from the same region pointed, climate adaptation plans are generally dynamic and under frequent revision:

> *"The process of this climate adaption moves so fast that we kind of need to do these updates like every few years." (Interview Pärnumaa, 0:25h)*

Hence, these dynamic processes may allow for rapid implementations of new considerations and recurring finetuning and peer learning. While not addressing the topic of updating, in the Danish Køge Bay, a dynamic inter-municipal peer learning process is already taking place in relation to the DK2020 climate adaptation plans, with positive outcomes:

> *"So an important point of this DK2020 project is that they are not doing the plans all on the same time. [..] And, it's much easier for the municipalities now to look at what did the first municipalities do? And they can make much better climate plans just by looking at what did others do. So they definitely have a big advantage". (Interview Køge Bay, 0:43h).*

Knowledge and awareness

Part of the challenge in involving and recognizing vulnerable groups, is defining whom these are. Some stakeholders refer mainly to spatial vulnerability (exposure perspective), while to the topic of social vulnerability, we often met a general insecurity to the topic of definition, as expressed by a regional stakeholder from the Basque Country puts it:

> *"As far as I know, there is no standard definition of what is vulnerable groups." (Interview Basque Country, 0:40h)*

That said, the regional stakeholder pointed out that, despite vulnerable groups not being defined, some socio-economic indicators are included in the regional vulnerability and risk assessment, allowing the prioritisation of adaptation measures for the most vulnerable groups. Still, the stakeholder highlights that a definition from R4C, or

R4C partners, would aid the regional definition. Along those lines, another stakeholder from the same region, expressed expectations that approaches tested out in the R4C intervention could be applied in other regions in the future:

> *"… we will define [vulnerable groups]. But I mean because of this impact, and the capacity they have to react to this negative impact. Maybe this is somehow an exercise that can be also used for other areas in the future." (Interview Basque Country, 0:42h)*

While the task of analysing and defining the vulnerable groups, may be included into the project, plan or strategy, some meet the issue, that projects are developed and prioritised according to the needs of a 'regular citizen'. A regional stakeholder in Helsinki-Uusimaa raised the issue of the standard understanding of an 'average citizen' in plans:

> *"In most of the project that I've seen close or been involved in, a regular citizen, is just very like a white, middle aged male person, very neutral, somebody who doesn't have any disabilities or anything other that's like disturbing their normality. […]. And when putting a regular project into practice, it's quite strictly written there what you can do and what you can't do. Like, okay, there is some flexibility, but you can't fully change the focus and there is no time usually to define who are the vulnerable people." (Interview Helsinki-Uusimaa, 0:28h)*

A reflection that poses the question of when and how to best include perspectives from, and consideration of, socially vulnerable groups.

As climate adaptation projects often address large-scale regions, there could potentially be an increased risk of overseeing these in the implementation. As exemplified in the French context, where, the size of the greater region may be so large that minor groups of socially vulnerable individuals are at risk of being overlooked, if not actively addressed.

> *"[T]he Agglomeration is quite large […], it's rather homogeneous in term of living level. I would say that most of the communities are rather informed and connected to the public life and especially to the issue of a coastal management, because they really live the day-to-day basis with the coast and very close from the ocean. […] I would not say, that from this point of view that there is large social threat for any specific group. But. Maybe this could be confirmed or studied as well." (Interview South Aquitaine, 0:31h)*

In the vastness of a large territory, vulnerable groups may appear minor, and potentially challenging to incorporate into the large strategic framework.

Cultural history across the regions

R4C comprises a heterogeneous landscape of regional contexts. While the point may seem slightly banal, and addressed more in detail in other deliverables, the topic received general attention from multiple stakeholders, and we will bring a few examples here, of how the inclusion of socially vulnerable groups found to be related to the specific cultural context.

For example, a Basque Country stakeholder reflected on participatory processes, and a relatively top-down process tradition in the Basque society:

> *"I think traditionally all the participatory process have been driven in a top-down approach. So it's very structured from the public administrations and they open the consultation process very top down. Then*

culturally speaking, I think our society is shifting, but traditionally we are not used to be involved in these participatory processes. Now it's changing and there are a lot of social movements and young people and organizations. I think it's still very structured, quite rigid, top down and the participation is through organizations and not that much from individuals or citizens." (Interview Basque Country, 0:51h)

A regional stakeholder in Pärnumaa, contributed with the perspective, that through the latter years of crisis, an increasing preparedness and understanding could have better resonance:

"*There is this saying in Estonia now that we live in the situation of constant crisis. So because there was this COVID crisis and then there is the war crisis and then there is going to be the climate crisis and so on. So people understand that, although the cause of the crisis might be different, but the effect or the outcome of the crisis is going to be quite similar in many occasions. "(Interview Pärnumaa, 0:29h)*

Summary and insights

A growing attention to the topic of socially vulnerable groups appears throughout the interviews. Still, all these interviews were conducted under the explicit focus on the topic, hence the isolated act of conducting the interviews, may be adding to an increased experience of attention to the topic. A lack of clarity and at times confusion about the terminology on social vulnerability was a general tendency, while finally the difference in cultural history of each region must be considered as a parameter in evaluating and concluding on the topic.

As social vulnerability is identified to be an emerging concept in the regions, it is recommended that the local use of the term is made explicit, both internally within regional government organisations and externally across regional stakeholder groups. Understanding the notion of social vulnerability in relation to climate change is a precondition for framing, discussing and developing strategies and specific plans at the local and regional levels. While strict definitions of vulnerability are still debated in academia, one way to approach the concept is to consider vulnerable social groups and economic sectors as separate from – but also exaggerated by - exposure (see Table 3.2).

4. Synthesis and conclusion

This initial analysis of social vulnerability in the R4C demo regions consists of a quantitative analysis of selected indicators, an initial mini-survey and 12 semi-structured interviews informed by regional climate adaptation plans and strategies, and the proposed R4C interventions.

The quantitative analysis shows us that indicators are strongly related to the national context, with differences between countries usually higher than differences between a region and its country. We can also see urban-rural differences. Ageing, education, employment in agriculture, forestry and fishing and health services seem to be related to an urban-rural divide. There are also singularities visible, regions sticking out from the national averages, which describe very specific settings of some of the regions, e.g. the very high population density in Køge Bay (DK) and the high number of tourist arrivals per capita in Crete (EL).

Also, for some regions only a few indicators are of concern in a comparative view, while others stick out with comparatively low/high values in several indicators. With only 12 regions (out of several hundred regions in Europe) a general quantitative analysis has only limited validity. Also, regional aggregates do not tell about actual combinations of attributes at the individual level. Finally, the different spatial levels of data availability might hide some patterns of concern, only visible when zooming in. This can be especially the case for the Troodos network on Cyprus, an inland mountainous region and where no regional data is available in Cyprus. However, the comparative view on the 12 regions contributes with a first understanding of ranges of vulnerabilities, while other work in the project (e.g. in WP3) will zoom further into the cases.

Zooming in on the narratives in the regions, relating social vulnerability and climate adaptation may pose the first challenge; in some regions we see a tendency to disassociate the two topics, treating them in separate governance departments. Reaching a common understanding and terminology in the field, may make the topic more approachable. To make social vulnerability to climate change operational in the field, the regions are recommended to make a distinction between socially vulnerable groups (e.g. the elderly) and vulnerable economic sectors (e.g. agriculture) as well as exposure (i.e. the location and presence of a vulnerable group or sector in relation to a given climate hazard such as drought or flooding).

The engagement and involvement in the topic of regional climate adaptation poses a general challenge due to the large geographical scale, the long timeframe, and the at times abstract nature of these projects. Maintaining engagement throughout these planning processes is a general challenge, along with ensuring relevance and local anchoring. It is recommended that regions adopt a dual perspective where specific short-term actions on the ground are used as leverage points to develop regional resilience to climate change long term.

When turning specifically to socially vulnerable groups, a series of specific concerns were raised. One is the requirements and specificity of communication approaches that may be needed for each individual group, while the expectation of (lack of) adaptive capacity can be a challenge to the motivation for involvement. Moving forward, it is recommended that the regions identify ways to empower socially vulnerable groups to inform decisions impacting their lives and livelihoods – with a view to the region's specific social and cultural context.

As the R4C cases have varying governance structures, the question of when and where to incorporate considerations of socially vulnerable groups, will need to be addressed, and the answers may vary from case to case. The motivation for involving socially vulnerable groups could originate in national/regional strategies, grants and local engagement, but at times incentives are unclear, and the engagement with the topic may be equally affected. Reviewing specific past and present projects is expected to be a relevant starting point for the regions to map out the governance structures, the funding mechanisms and the power relations at play. This can make

possible path dependencies explicit and help the regions to identify relevant leverage points for socially just climate adaptation that leaves no one behind.

Despite the limitations of this analysis, e.g. regarding the use of regionally aggregated data or the limitation to only have one interview per demo region, we hope that the data included, and the specific examples and narratives can be part of developing an initial understanding of considerations regarding social vulnerability and climate change in the Regions 4 Climate demo regions.

D2.1 is only a very first starting point and other (forthcoming) project tasks provide more details on different aspects opened up here. E.g. the just transition roadmaps (WP2) recommend that regions “adopt a dual perspective where specific short-term actions on the ground are used as leverage points to develop regional resilience to climate change long term.” WP3 will analyse data derived from the cases partners, providing a more detailed perspective on local dynamics. The Governance analysis (WP4), exemplifies how to reviewing specific past and present projects is expected to be a relevant starting point for the regions to map out the governance structures, the funding mechanisms and the power relations at play. This can make possible path dependencies explicit and help the regions to identify relevant leverage points socially just climate adaptation that leaves no one behind.

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6. Annex

The annex includes background material as separate files:

- Excel file with **regional indicators**
- **Mini-survey**
  - Questionnaire send out in January 2023 to the 12 demo regions.
  - Summary table of results
- **Interviews**
  - General interview guide which was slightly adapted for each interview.
  - Interviews were recorded and automatically transcribed. Letters of consent were collected from all participants allowing to share the transcripts for internal use (R4C project partners).
  -