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COVID-19:
Visualizing regional socioeconomic indicators for Europe

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Preface

The COVID-19 pandemic struck the world out of the blue and displayed unprecedented transmission rates. Part of the reason for its rapid worldwide spread, was the nature of the virus itself, its presentation (symptoms were visible well after a person was infected) and the highly complex, interconnected world we live in today. An equally important contributing factor is our, now apparent, collective inability to deal with a rapidly emerging global threat in a coherent and integrated manner across countries and continents. Our existing multilateral systems are simply not yet geared to respond to such an emerging global challenge in an adequate and timely manner. The plethora of national responses have also been shown to be inadequate.

The extent of our inter-connectedness has led us to recognize that we live in a global village, and this pandemic has removed any remaining doubts. However, the underlying global order of pervasive tourism, trade, business, education has the potential to create vulnerabilities while also generating critical sector specific information that could be systematically harnessed in order to allow rapid and effective global and national responses to risks. Undoubtedly this data is being collected in some form. At a more operational level the world is still struggling to bring together the necessary data from across different sectors of society, across scales and a sufficiently integrated manner to fully enable a rapid analysis and a comprehensive disaster risk mitigation response. The looming era of machine learning and artificial intelligence too has the potential to fast-track our capabilities and responsiveness to such epidemics, but presently, we are still struggling to access relevant information and timely data at appropriate scales and resolutions.

Early information from the COVID-19 pandemic suggested a greater vulnerability of older citizens to the virus. Current mortality patterns support the notion that the elderly, especially those with underlying medical conditions, are more vulnerable. However, clearly, all segments of the population are vulnerable. In the absence of an available cure for the virus, key measures deployed to limit transmission include to curb mobility, social distancing, to strengthen the medical infrastructure to improve the palliative treatment for vulnerable patients (ventilators) and protect key medical practitioners (protective clothing and masks). A fully functional coordinated system of international cooperation would help with the effective execution of many of these measures. Given that the pandemic has now reached nearly all countries around the world and is still spreading, countries are responding by shutting borders and are competing for scarce resources – medical, technical, and/or financial. The developing geography of the pandemic illustrates how different countries become more vulnerable at different times during the development of the pandemic – not all countries are necessarily equally vulnerable at the same time. The same principle applies to different parts within a country (Northern Italy, New York). In understanding these differences, mortality rates are probably a more robust indicator, albeit delayed, considering the different modes and extents of COVID-19 testing implemented around the world.

Clearly COVID-19 has caught all of us off guard, yet we need to respond to the emerging crisis to the best of our ability. While numerous epidemiological analyses and models are currently informing and assisting global decision makers to respond to the virus, we at IIASA can assist by making available critical socioeconomic and demographic data that may be of use to policymakers and the health community to allocate scarce resources more strategically between countries and even within countries.

This IIASA mapbook is made available to rapidly and urgently disseminate key demographic and population information in a visible form to assist health professionals, disaster response operations, governments and policymakers from across the European Union. This IIASA mapbook publishes and will continue to expand on a list of key indicators that can be used to better understand the socioeconomic and demographic contexts under which the current COVID-19 crisis is unfolding. Accessible data is presently limited to the EU.

Albert Van Jaarsveld

Director General

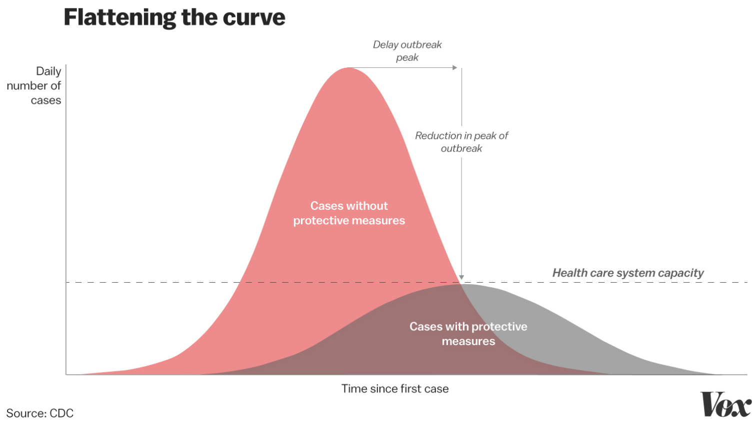
Leena Srivastava

Deputy Director General for Science

1 Introduction

The recent Corona virus (COVID–19) outbreak in the EU has drastically impacted daily life across all age groups. Current estimates suggest that the 65 plus and especially 80 plus age group are at the highest risk from the virus. This is particularly important in the EU, which not only has an aging population, but there are also huge variations across regions in terms of economic development. The combination of these two points implies that different regions face different challenges in terms of spread of the virus, burden on the public health and social security system, and economic losses.

Fig. 1: Flattening the curve



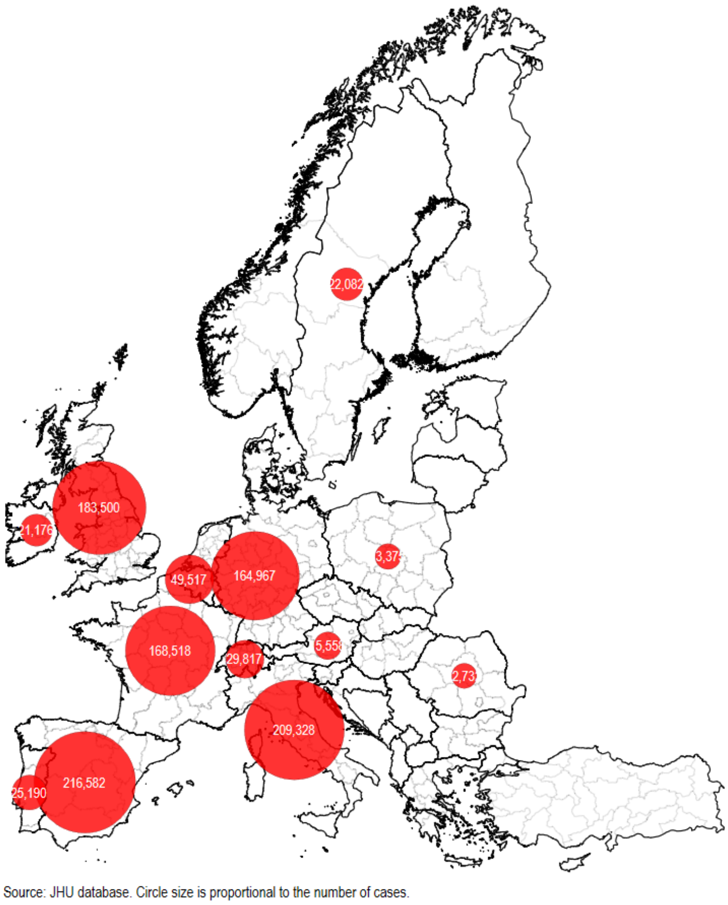
Source: https://www.vox.com/2020/3/10/21171481/coronavirus-us-cases-quarantine-cancellation

The spread of the virus in Italy has forced EU countries to take drastic measures like shutting down public spaces, schools, and businesses, and limiting mobility and human interaction, a phenomenon that is referred to as "social distancing" with the aim of "flattening the curve". In other words, the less the interactions, the slower the spread of the virus, and the better the health care system is capable of handling it.

Figure 2 shows the actual number of reported COVID-19 cases on May 3, 2020. The figure highlights large variations in the number of cases represented by different bubble sizes. While Italy was the first to be massively hit, other countries like Spain, France, Germany, Belgium, UK, Ireland have also seen very high growth. These numbers, while important, need to be taken into consideration with a host of socioeconomic factors to properly understand the full impact of the virus. For example, population size, policy stringency and health system are key in the short run to look at the direct mitigation efforts. Other impacts like unemployment, production losses, supply-chain disruptions, also need to be systematically understood both for a better understanding of immediate impacts and long-run policy planning.

In order to understand these impacts, this document presents a series of graphs and maps that aim to visually explore demographic, socioeconomic, and health-related indicators for NUTS 2 regions in European. NUTS stands for Nomenclature of Territorial Units for Statistics that exist at four levels.

Fig. 2: Number of COVID-19 cases (May 3, 2020)



Source: John Hopkins University (JHU) Coronavirus Resource Center (https://coronavirus.jhu.edu/map.html). Data retrieved on document compilation date. Only countries with more than 15,000 confirmed cases are highlighted.

NUTS 0 represent countries, NUTS 1 represent provinces, NUTS 2 are districts within provinces, and NUTS 3 are finer level subdivisions usually representing counties within districts.[1]

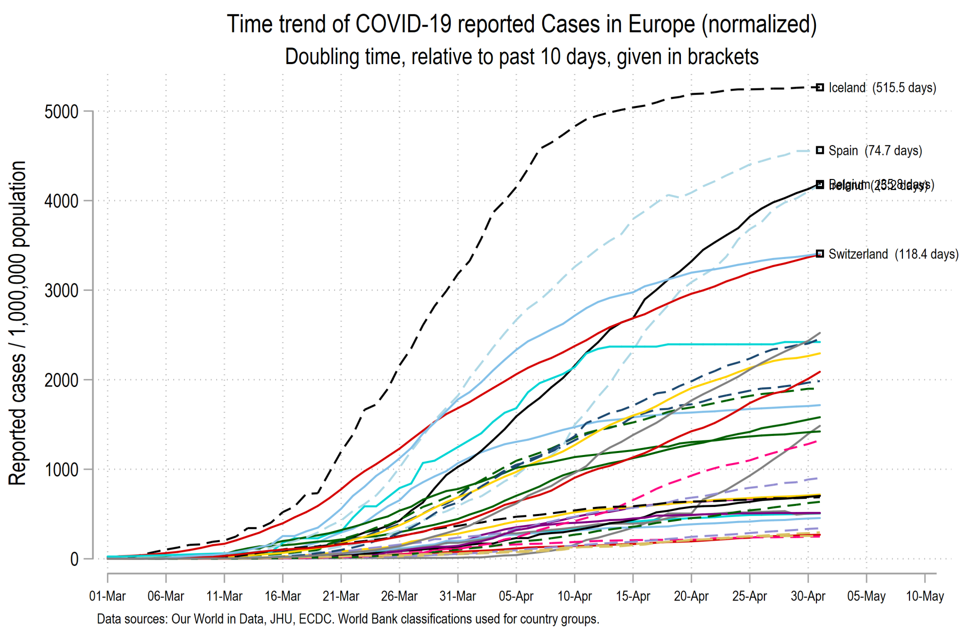
The data for this project has been compiled using publicly available information from the Eurostat database (https://ec.europa.eu/eurostat/data/database). Selected indicators from this database are used to showcase regional variations in Europe in relation to COVID-19.

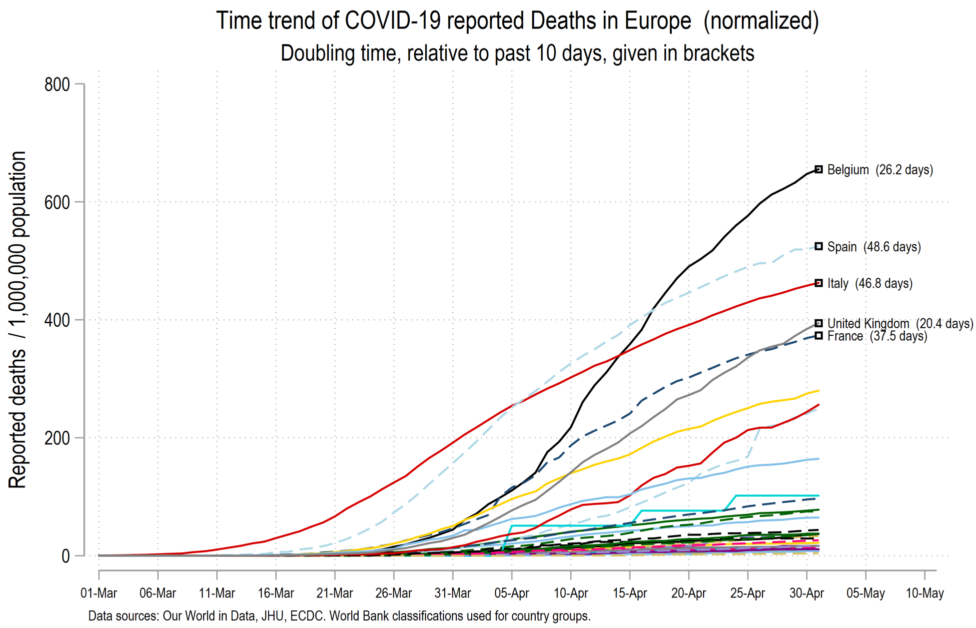
This document will be regularly updated to reflect changes in reported cases and to update the maps.

[1] For more information, see Eurostat https://ec.europa.eu/eurostat/web/nuts/background

2 Current COVID-19 trends (May 3, 2020)

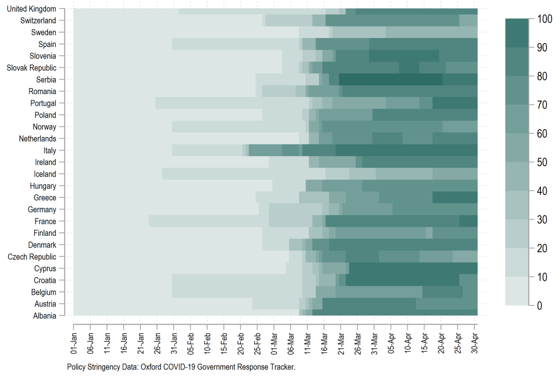
Fig. 3: Reported cases and deaths per 1 million population



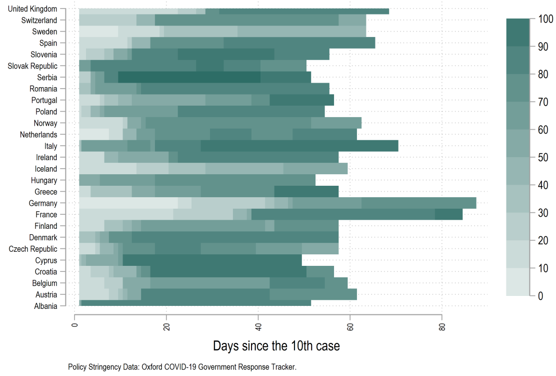


Note: The figures show the trends across European countries starting 1st March. Only top five countries are shown. Doubling time shows in how many days cases or deaths double.

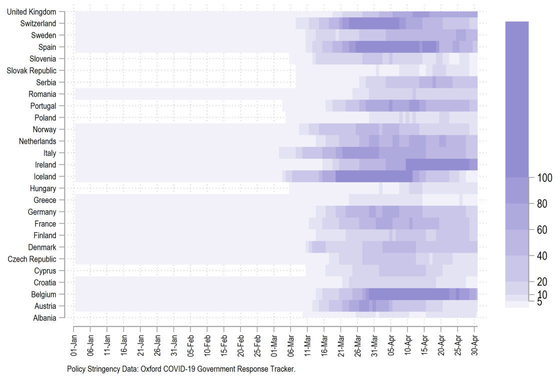
Fig. 4: COVID-19 Policy Response



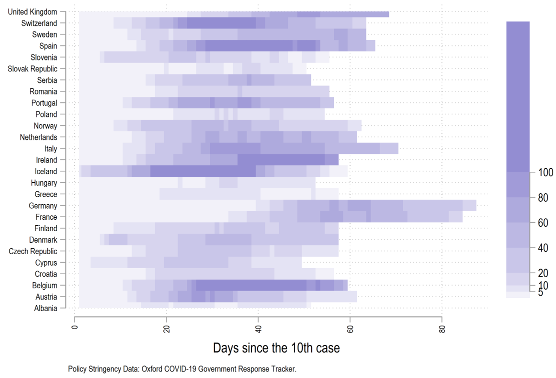
(a) Policy Stringency Index



(b) ... relative to the 10th case



(c) Daily changes in cases

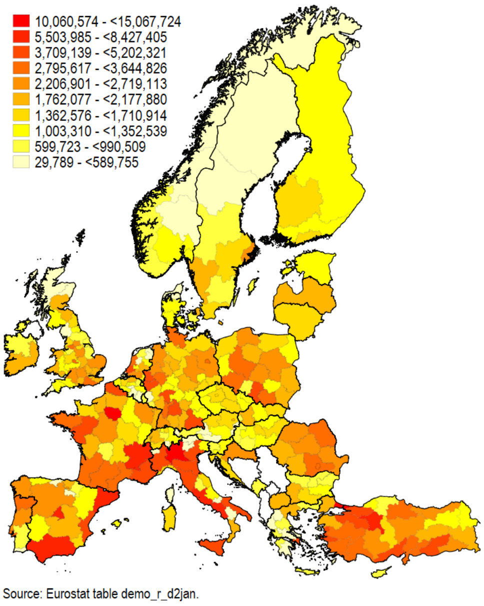


(d) ... relative to the 10th case

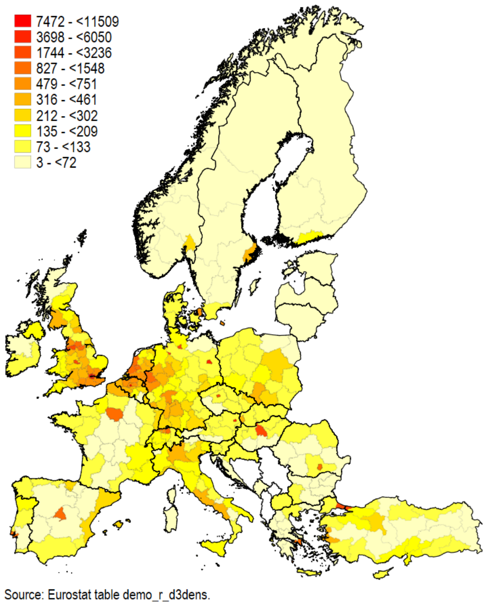
Note: The The COVID-19 Policy Stringency Index is generated by the Oxford Government Response tracker (https://www.bsg.ox.ac.uk/research/research-projects/oxford-covid-19-government-response-tracker.). Fig. (a) shows the strength of the policies as they were introduced. Some countries have started relaxing their measures after slowing down the daily changes in cases (Fig. c). Some COVID-19 cases appeared at different times in different countries, Figures (b) and (d) track policy response and daily changes in cases relative to the 10th case. Some countries moved extremely fast in restricting the spread of COVID-19 cases.

3 Demographic indicators

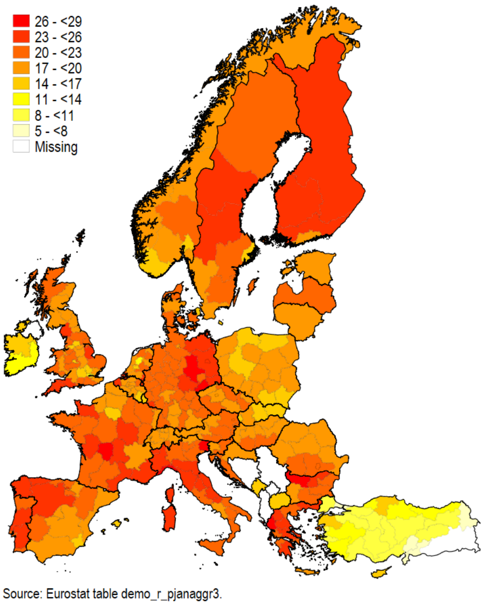
Fig. 5: Population indicators



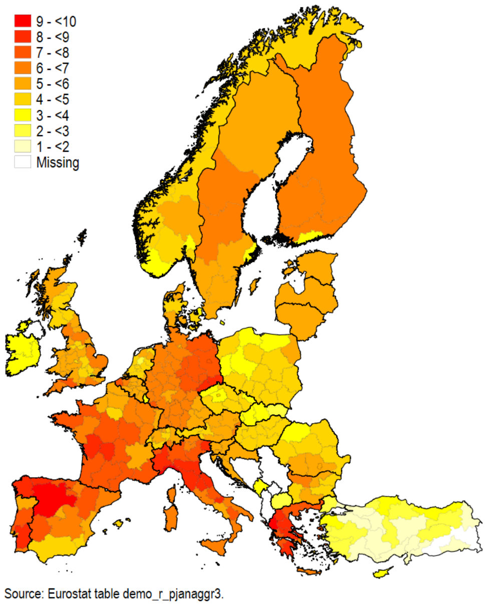
(a) Total population (2019)



(b) Population density (2018)



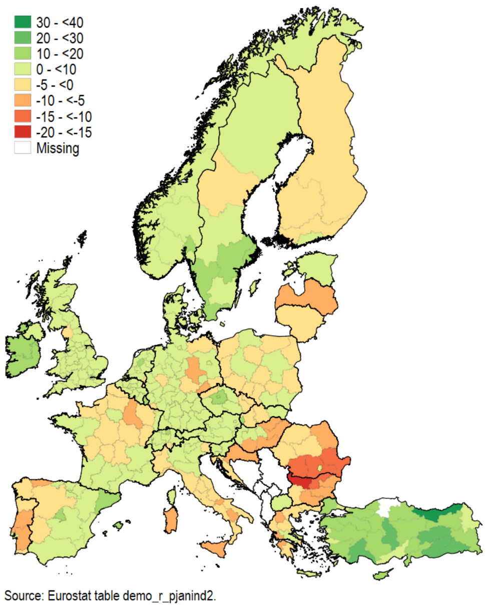
(c) Share of age 65 and above (2019)



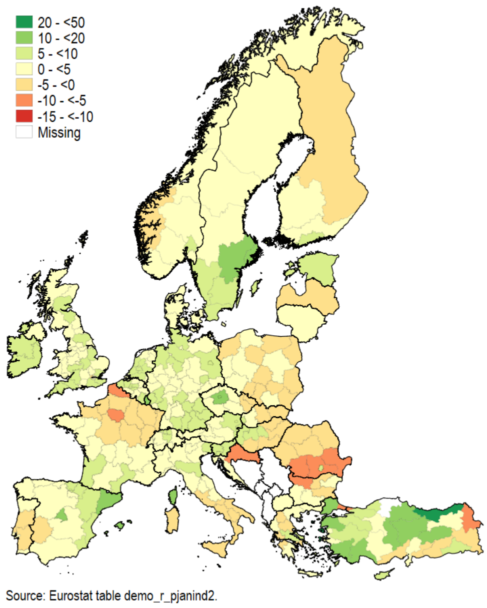
(d) Share of age 80 and above (2019)

These maps highlight the demographic setup of Europe. Figure (a) shows actual population levels. Figure (b) shows population density which is highly concentrated around cities and industrial zones. Figures (c) and (d) present the share of population aged 65 years and over and 80 years and over, respectively. In most NUTS2 regions, the people age 65 years and older represent 20-30% of the population.

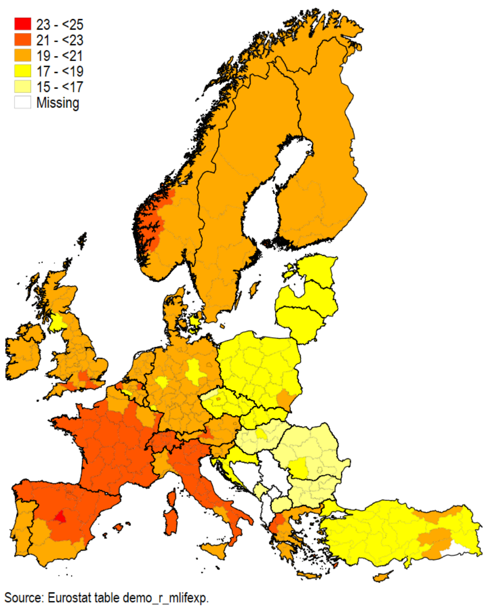
Fig. 6: Migration and population changes



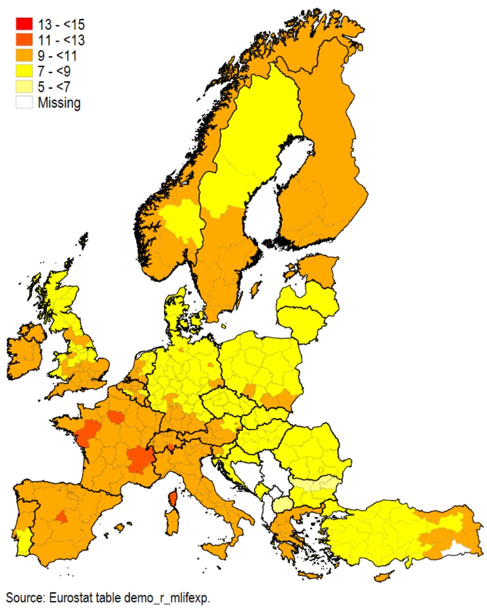
(a) Population growth rate (2018)



(b) Net migration rate (2018)



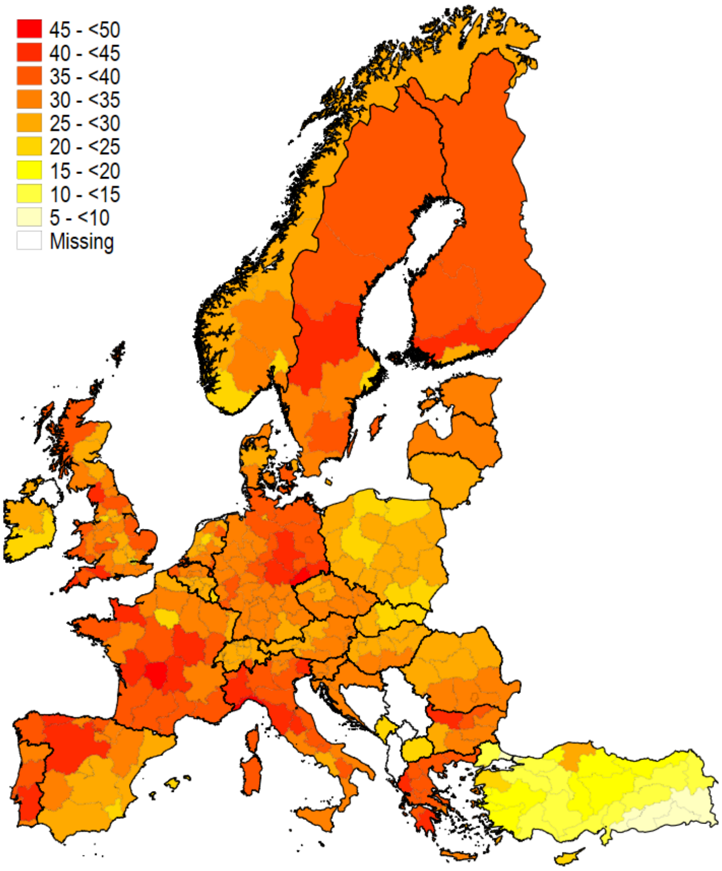
(c) Life expectancy at age 65 years old (2018)



(d) Life expectancy at age 80 years old (2018)

Figure (a) shows the population growth rate. Shades of red indicate depopulation of regions. Figure (b) is the net migration rate which is the difference between in-migration versus out-migration. Some regions are driven by net-migration changes rather than changes in "natural" growth rates (high birth rates in domestic population). Life expectancy graphs, shown in Figures (c) and (d), indicate the number of additional years persons age 65 and 80 are expected to live respectively.

Fig. 7: Old dependency ratio in % (persons aged 65 and over/persons age 15-64) (2019)

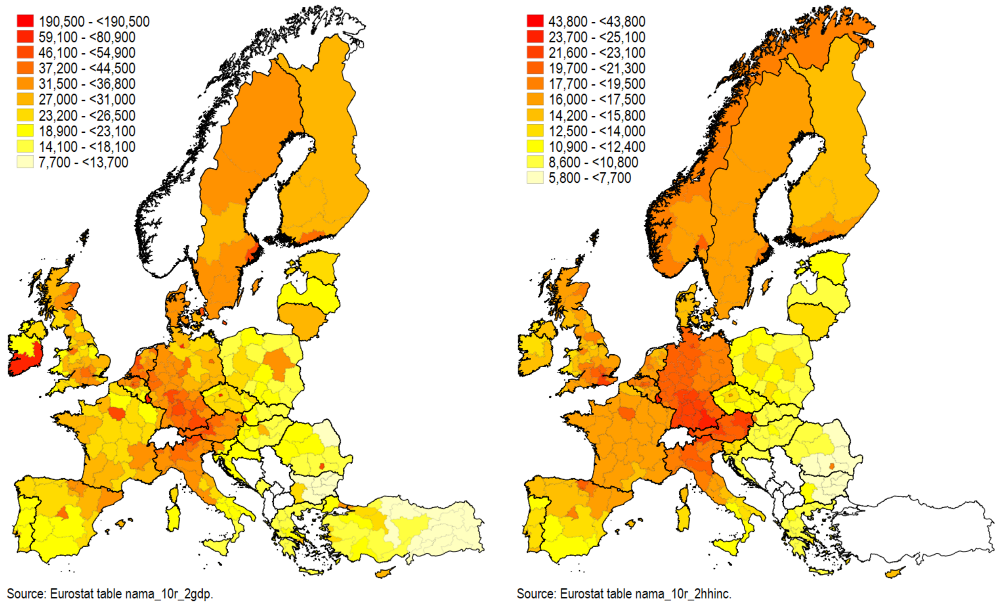


Source: Eurostat table demo_r_pjanind2.

The old dependency ratio is a standard indicator used in demographics to indicate the share of population age 65 and over to working age population. Within the EU regions, this number is considerably high, in some places reaching 50%, implying that one person aged 65 years or over is supported by two working-age persons (age 15-64). This has strong implications for inter-generational transfers of public health, social security, and pensions.

4 Economic indicators

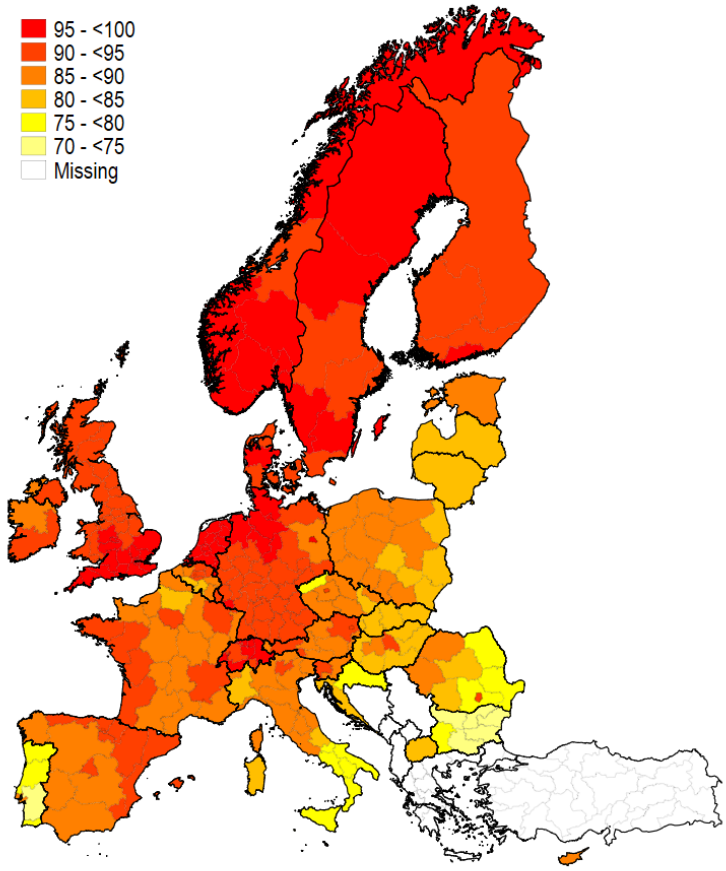
Fig. 8: Economic well-being (2017)



(a) GDP per capita (2018) (b) Average HH income (2017)

Income is an indicator of a coping mechanism. As the figure shows, there is a huge variation between the central "core" and the eastern and southern "periphery" regions. Also note that GDP per capita might be higher that average household income since it also includes government spending, investment, and net exports.

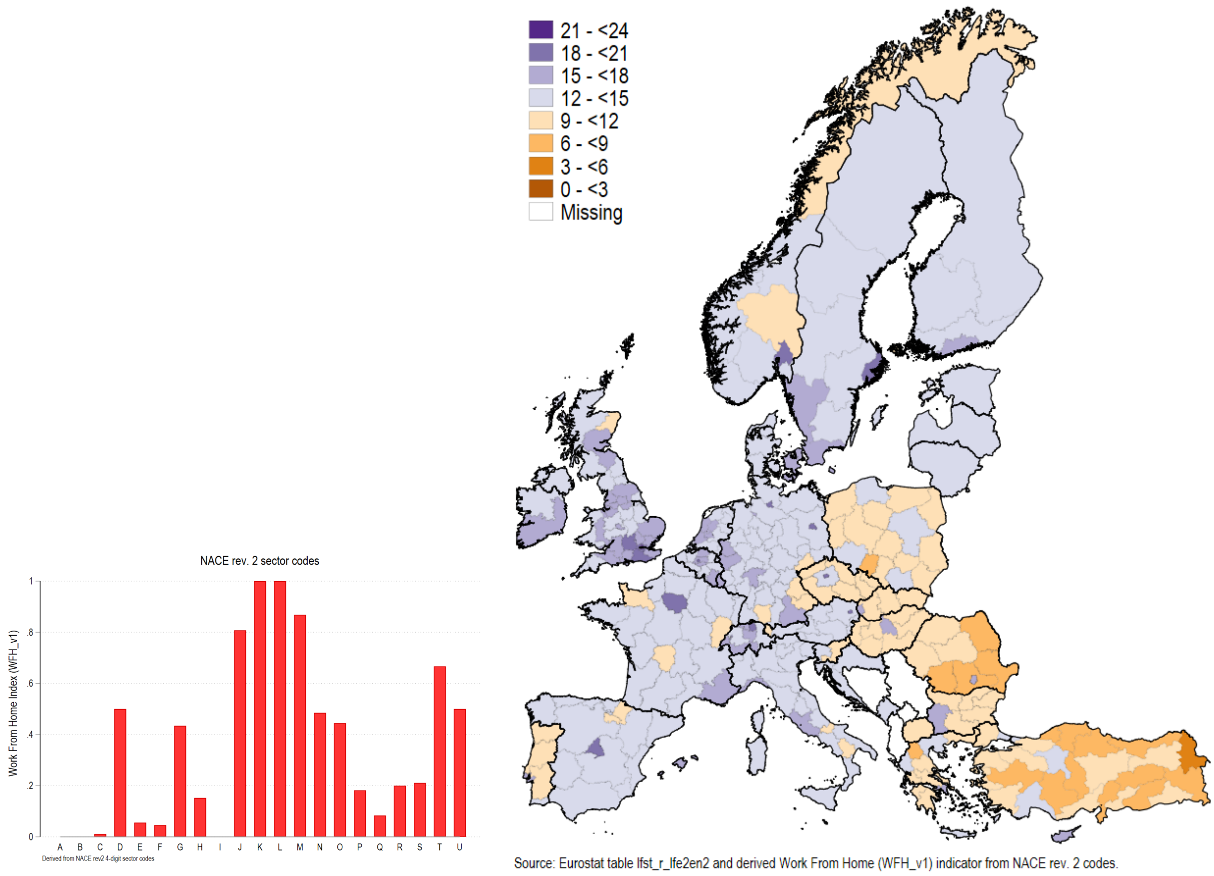
Fig. 9: Percentage share of population with internet access (2019)



Source: Eurostat table isoc_r_iacc_h.

This map indicates the percentage share of population that has access to any type of internet. As the map shows, there is considerable variable across NUTS 2 regions.

Fig. 10: Work From Home Index (2019)



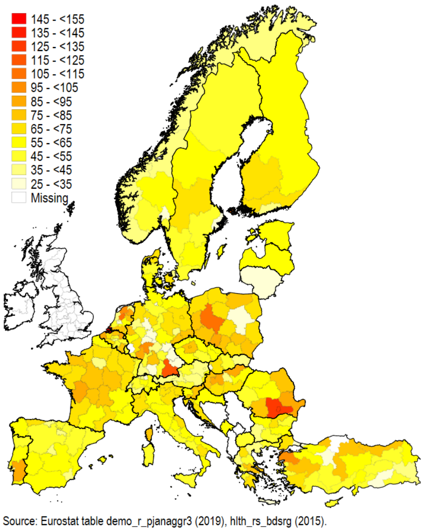
(a) Work From Home Index (WFH v1) (b) % share of workers who can potentially work from home

Here we take NACE rev.2 4-digit sector codes (can also be mapped to ISIC and other industrial codes) and code sectors which allow work from home (0 = cannot work from home, 0.5 = maybe, 1 = definitely can). These are aggregated to the broad one-digit sector level. If we take this index and multiply it with information on jobs at the NUTS 2 sectoral level, we get the above map for Europe. Based on the current definition, at best 24% of the jobs can be done from home and they are clustered in certain locations like cities, financial headquarters, regions with high tertiary economic activities etc. Please note that the WFH Index will be refined in subsequent updates.

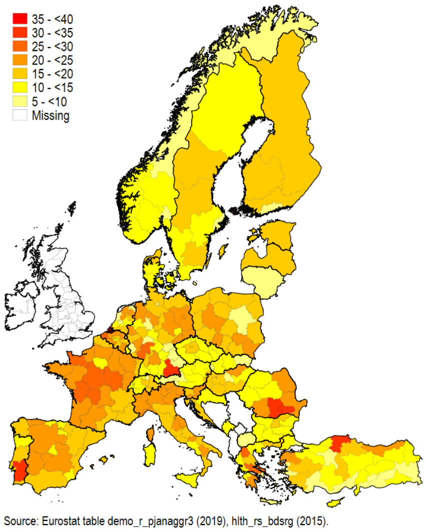
NACE rev.2 sector codes: A=Agriculture, Forestry and Fishing, B=Mining and Quarrying, C=Manufacturing. D=Electricity, Gas, Steam and Air Conditioning Supply, E=Water Supply; Sewerage, Waste Management and Remediation Activities, F=Construction, G=Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles, H=Transportation and Storage, I=Accommodation and Food Service Activities, J=Information and Communication, K=Financial and Insurance Activities, L=Real Estate Activities, M=Professional, Scientific and Technical Activities, N=Administrative and Support Service Activities, O=Public Administration and Defence; Compulsory Social Security, P=Education, Q=Human Health and Social Work Activities, R=Arts, Entertainment and Recreation, S=Other Service Activities, T=Activities of Households as Employers, U=Activities of Extraterritorial Organisations and Bodies.

5 Health-related indicators

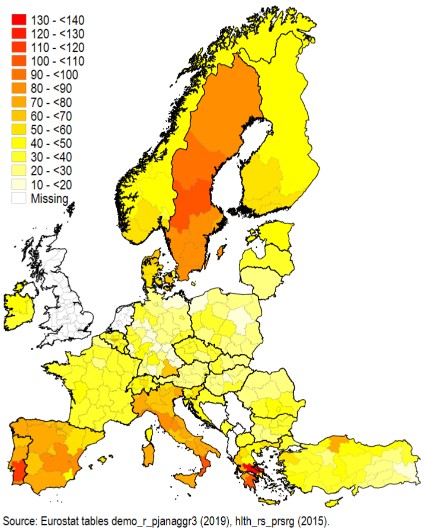
Fig. 11: Doctors and Hospital beds



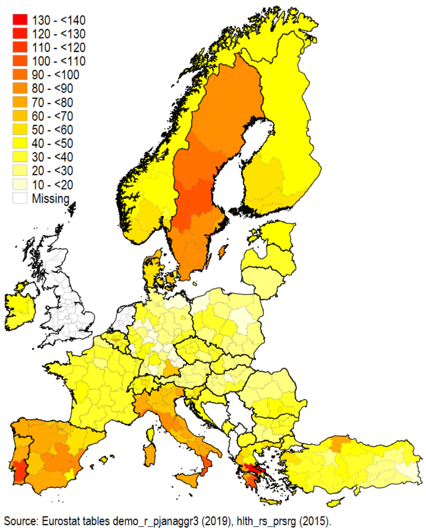
(a) Share of 65+ to doctors



(b) Share of 80+ to doctors



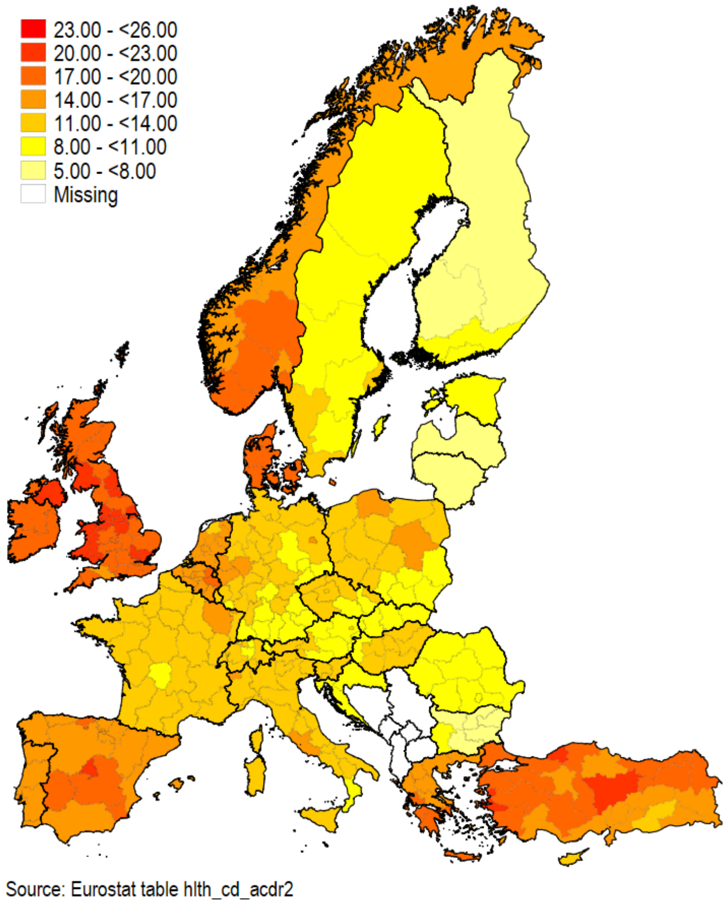
(c) Share of 65+ to hospital beds



(d) Share of 80+ to hospital beds

These figure show the share of age 65 and 80 plus population to doctors and hospital beds. A darker share indicates that there is a higher ratio of population to medical facilities, potentially indicating a stress on the system.
Note: Data for population from 2019. Data for doctors and hospital beds is from 2017 or earlier, which is the most complete dataset on Eurostat. Germany (DE) provided information at NUTS 1 level only. This has been evenly split across NUTS2 levels. UK provided national level (NUTS 0) information only. NL provides national level (NUTS 0) information only for hospital beds. These were skipped.

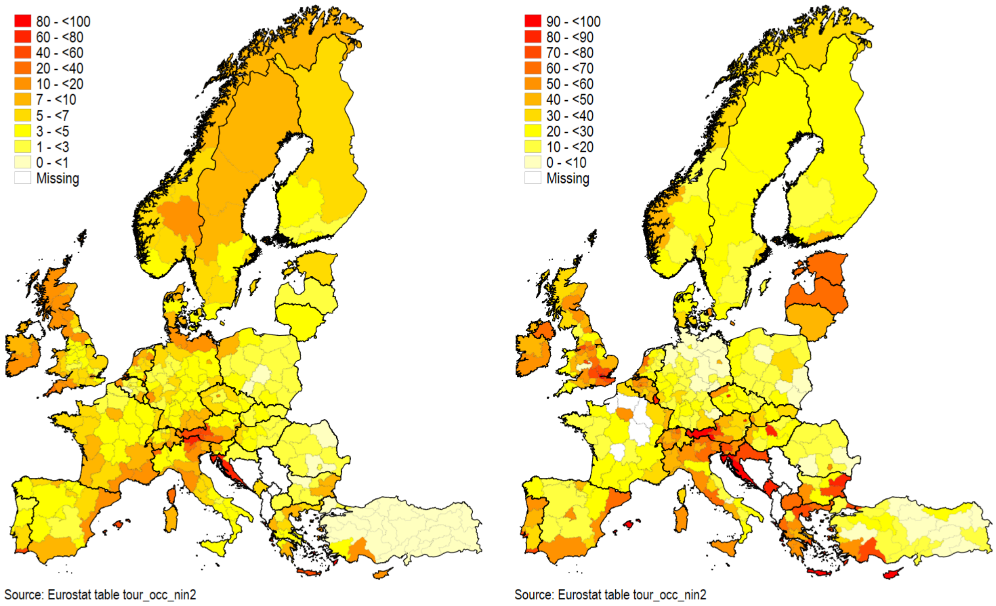
Fig. 12: Percentage share of lungs/respiratory-related death in total reported deaths (2016)



This map is intended to indicate regions where lungs or respiratory-related deaths are the highest amongst all reported deaths. These areas might suffer from poor air quality that is likely to increase the impact of COVID-19.

6 Tourism

Fig. 13: Tourism



(a) Tourists per capita (2018) (b) Percentage of non-national tourists (2018)

Figure (a) represents the total number of tourists divided by local population. The map shows that alpine and coastal regions see very high traffic in terms of tourism reaching as high as 80–100 tourists per person. Figure (b) shows the share of non-national tourists, either from other EU countries or non-EU countries. Visits by non-national tourists are also concentrated around alpine and coastal regions.