ESPON

EUROPEAN UNION

Co-financed by the European Regional Development Fund

Inspire Policy Making with Territorial Evidence

REPORT //

Updating and Integrating PROFECY Datasets and Maps

ESPON 2020 data and maps updates II

Final Report // March 2022

Annex I – Map series

This report is conducted within the framework of the ESPON 2020 Cooperation Programme, partly financed by the European Regional Development Fund.

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This delivery does not necessarily reflect the opinions of members of the ESPON 2020 Monitoring Committee.

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Disclaimer

This document is a final report.

The information contained herein is subject to change and does not commit the ESPON EGTC and the countries participating in the ESPON 2020 Cooperation Programme.

The final version of the report will be published as soon as approved.

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Abbreviations

D1	Delineation 1. Higher car travel time to regional centres
D2	Delineation 2. Economic potential interstitial areas
D3	Delineation 3. Areas of poor access to SGIs
D4	Delineation 4. Depleting areas
GIS	Geoinformation system (s)
IP	Inner periphery, inner peripheries
km	Kilometer(s)
LAU	Local administrative units
Min	Minute(s)
NUTS	Nomenclature des unités territoriales statistiques
SGI	Service(s)-of-general-interest
UMZ	Urban morphological zone(s)
Vers.	version

1 Introduction

1.1 Project context

The aim of this project is to update ESPON PROFECY database and maps and adapt the results of the project ESPON PROFECY “Processes, Features and Cycles of Inner Peripheries in Europe” (Noguera et al. 2017a) to the latest developments regarding inner peripherality processes and drivers.

1.2 Conceptual framework

Inner peripherality is a multidimensional phenomenon which compounds the effects of various socio-economic processes that cause disconnection from external territories and networks. The notion of Inner Peripheries (IPs) comes from the more conventional concept of "peripherality", which focuses just on the geographic position of a region in relation to all centres of economic activity in Europe. Much more complex, talking about IPs includes a wider sense of "disconnection" in relation to the core areas. Their general performance, levels of developments, access to services, or the quality of life, are relatively worse when compared with their neighbouring territories.

The ESPON PROFECY project (Noguera et al., 2017a) identified three theoretical concepts which described *primary processes* or conditions of inner peripherality:

1. ***Enclaves of low economic potential,*** *described by the distance from centres of economic activity*. These are localities which have relatively high levels of "conventional" peripherality (low accessibility to centres of economic activity), but which are not "on the edge" of Europe.
2. ***Poor access to SGIs, poor connectedness***. IP processes driven by having poor access to SGIs (Services of General Interest), because of spatial distance, changing service delivery technologies, austerity, or other changes in provision such as privatization. It has a direct impact upon the human and social capital cycle, and thence an indirect (secondary) effect upon the productivity of economic activity, which feeds back into regional tax-raising capacity.
3. ***Aspatial peripheralization processes, as lack socio-political interaction.*** This driver is based on the disconnection from the centres of political power, which produces a lack of connectedness of stakeholders, exclusion from "the mainstream" of economic activity and lack of influence in terms of governance due to social and institutional characteristics, of individual, groups, firms, or organizations, rather than geographic features.

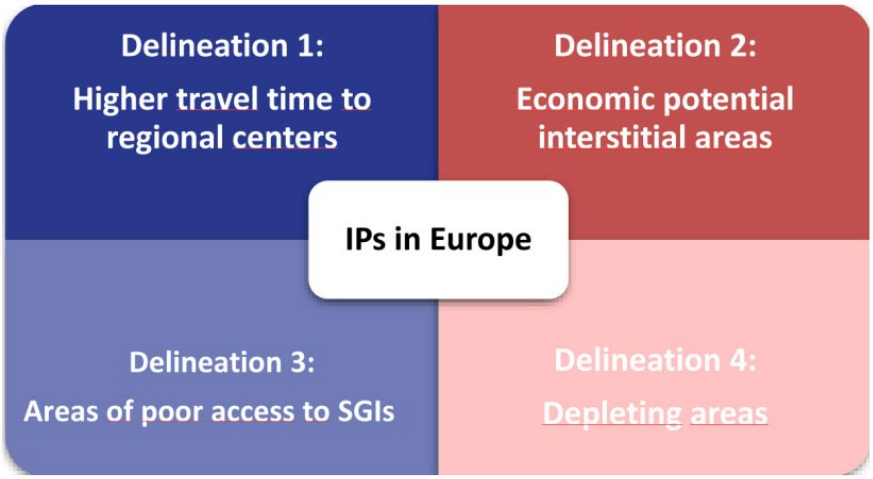
As for the methodology, the three theoretical concepts of the conceptual framework were translated into four operational delineations:

- **Delineation 1 (D1)** identifies IPs based on **higher car travel time to regional centres**, which are considered the most important centres for SGI provision and for all social and economic activities. D1 interprets IPs through the calculation of car travel times higher than in other neighbouring NUTS3 regions.
- **Delineation 2 (D2)** defines areas which are not on the physical edge of Europe but being surrounded by areas of greater centrality and have **low economic potentials** (expressed in potential accessibility).
- **Delineation 3 (D3)** identifies those areas with **poor car accessibility to public and private service** in comparison to surrounding areas and/or the region. A better connectedness to SGI contributes to reducing population loss, since it ensures higher quality of life.
- **Delineation 4 (D4)** identifies IPs based on **negative development processes.** These are areas that have entered a negative downward spiral due to increased unemployment, population loss and negative GDP development.

Inner Peripheries appear often in two or more delineations, since the drivers are all interconnected and overlap. For instance, an area with low economic potential (D2) is probably suffering from a negative downward spiral (D4). Also, there are areas that, although not being identified as IPs (poor access to five or more

SGI), are considered to be **areas at risk**. D3 gave immediate results used to identify areas at risk of becoming Inner Peripheries in the near future because of poor accessibility to three or four SGIs.

Figure 1-1. Delineations of Inner Peripheries (Noguera et al., 2017)



Source: Noguera et al. 2017b

1.3 Interest and overview of Annex 1

The purpose of this project is to update the Delineation 3 database ensuring comparability with 2017 calculations. Delineation 3 is composed of delineations for the following ten SGIs: (1) Banks, (2) Cinemas, (3) Doctors, (4) Hospitals and (5) Pharmacies (together representing health sector), (6) Primary schools and (7) Secondary schools (together representing education sector), (8) Retail (supermarkets and convenient stores), (9) Urban morphological zones (UMZ, proxy for jobs) and (10) Train stations (all passenger train stations). For six of these services, facility locations were updated (banks, doctors, pharmacies, primary schools, secondary schools, retail), for the remaining four services (cinemas, hospitals, train stations, UMZ/Jobs), facility locations from PROFECY study were used.

Annex 1 presents a collection of all the maps produced during this analysis. Chapter 2 illustrates the maps on a service-by-service base for all ten services. Chapter 3 presents the combined results for inner peripheral areas across all services, based on delineation 3, including main drivers of inner peripherality (based on the combination of delineations 1 to 4). In addition, the effects of border closures in the wake of the Corona pandemic are also analysed and presented in Chapter 4.

2 Individual services-of-general-interest

The following service types have been selected for the delineation and analysis of inner peripheries in Europe: Banks, cinemas, health care (doctors, hospitals, pharmacies), education (primary and secondary schools), passenger train stations, retail (supermarkets and convenient stores), and jobs.

Table 2-1: Overview of the selected services-of-general-interest.

Type of service	Updated	Number of facilities in ESPON space	Time threshold
Banks	✓	116,251	30 min
Cinemas	✗	8,385	45 min
Health care: Doctors	✓	68,959	30 min
Health care: Hospitals	✗	11,691	60 min
Health care: Pharmacies	✓	125,796	15 min
Education: primary schools	✓	169,672	15 min
Education: secondary schools	✓	50,033	60 min
Train stations: all passenger stations	✗	35,225	20 min
Retail sector: Supermarkets and convenient stores	✓	92,853	15 min
Jobs (places of work / urban morphological zones)	✗	5,078	n.a.[1]

In the following sub-chapters, doctors, hospitals and pharmacies are grouped to the health sector, and primary and secondary schools are grouped to education sector, resulting in seven sub-chapters 2.1 to 2.7. Each sub-chapter starts with a short overview about the maps produced, followed by a map gallery, where all maps are just presented without any further comments or descriptions. The sequence of maps is identical in each sub-chapter and follows the logical process of identifying inner peripheries.

[1] Due to the special methodological treatment of jobs, represented by UMZ as polygon features, the indicator "Availability of facilities within a certain time span" has not been calculated for this service, which means that a travel time threshold was not applicable.

2.1 Banks

The following maps have been generated as part of the delineation process:

- Banks in Europe
- Density of banks in Europe (2021) (2016 NUTS version)
- Density of banks in Europe (2021) (2021 NUTS version)
- Access to banks 2021: Travel time by car
- Access to banks 2021: Standardized travel time by car
- Access to banks 2021: Delineation of inner peripheries at grid level
- Access to banks 2021: Overlay of LAU units with IP areas at grid level
- Access to banks 2021: Identification of LAU units as inner peripheries
- Access to banks 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version)
- Access to banks 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version)
- Access to banks 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version)
- Access to banks 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version)
- Availability of banks within 30 minutes car travel time
- Banks: Areas of risk to become IP in future

Banking facilities:
Only bank *offices* were considered in the analyses, while locations of cash machines were excluded.

Figure 2-1. Banks in Europe.

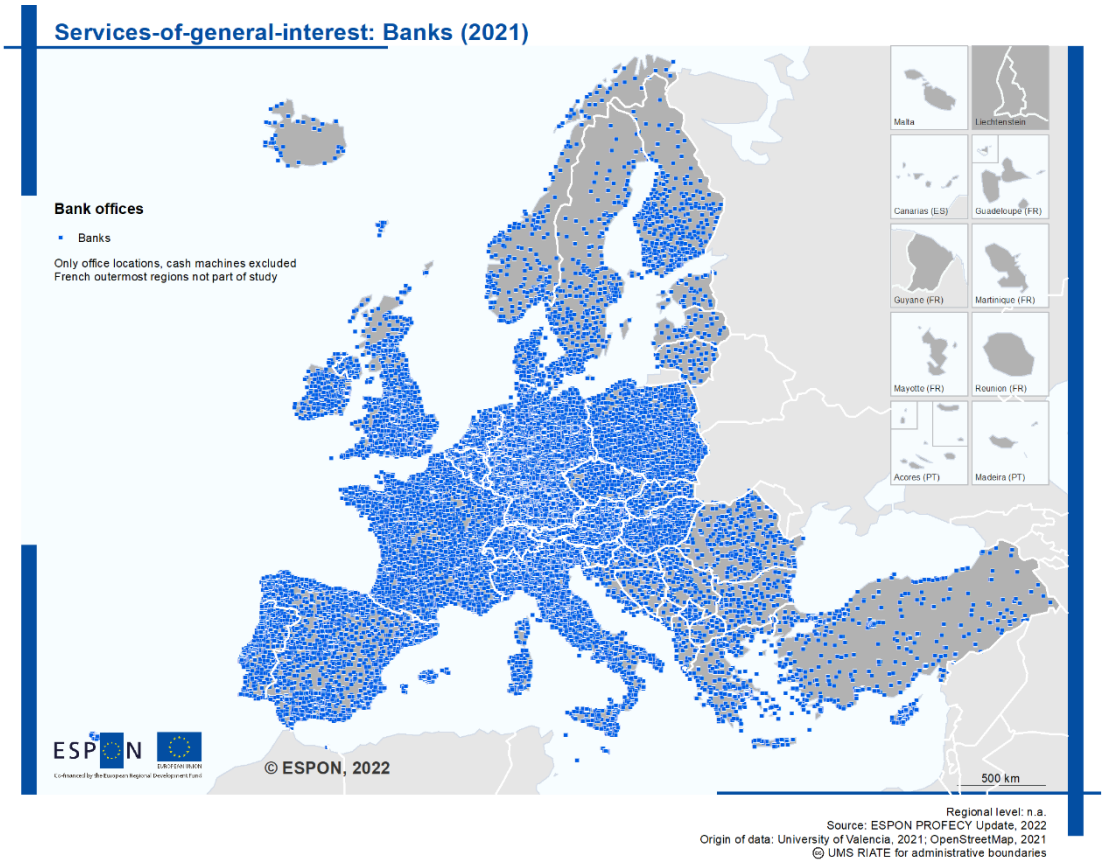


Figure 2-2. Density of Banks in Europe (2021) (2016 NUTS version).

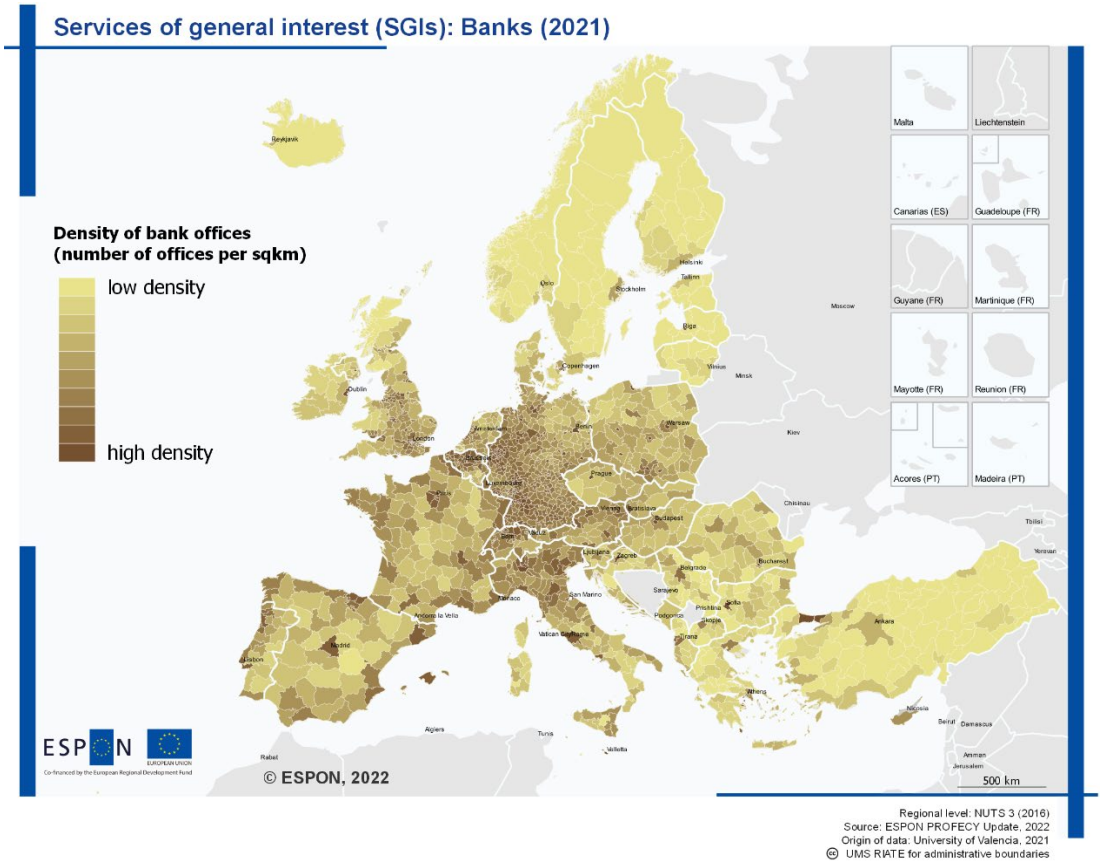


Figure 2-3. Density of Banks in Europe (2021) (2021 NUTS version).

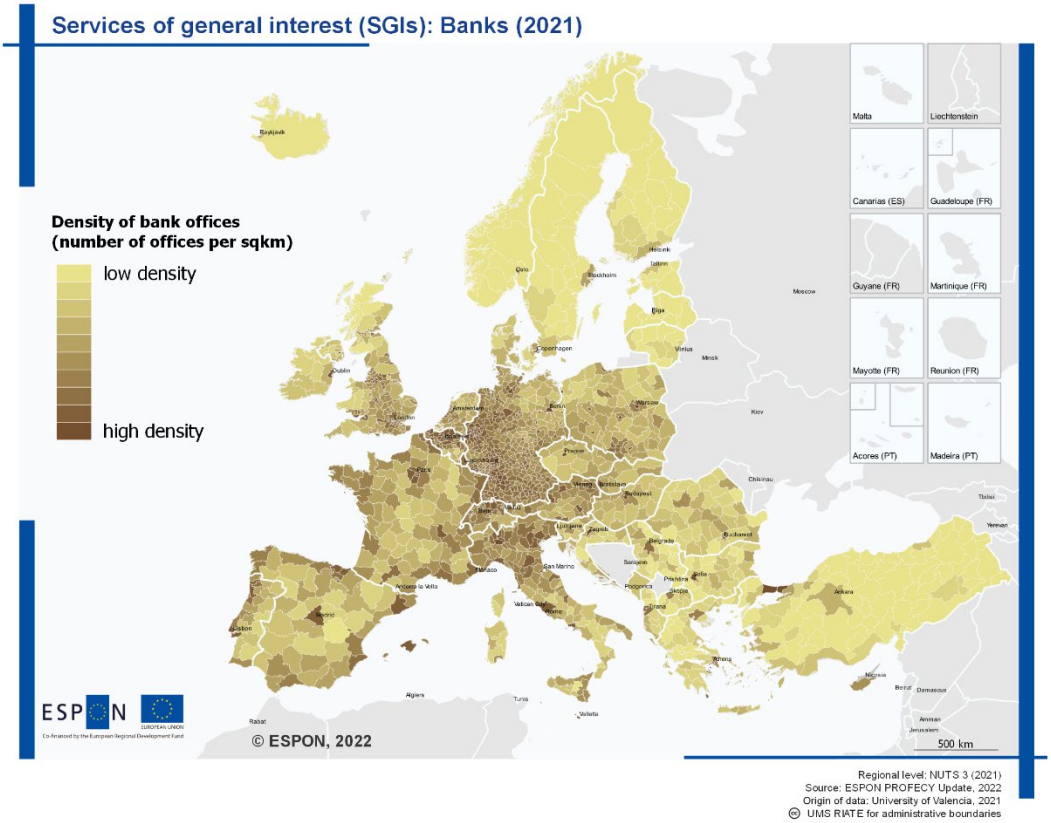


Figure 2-4. Access to banks 2021: travel time by car.

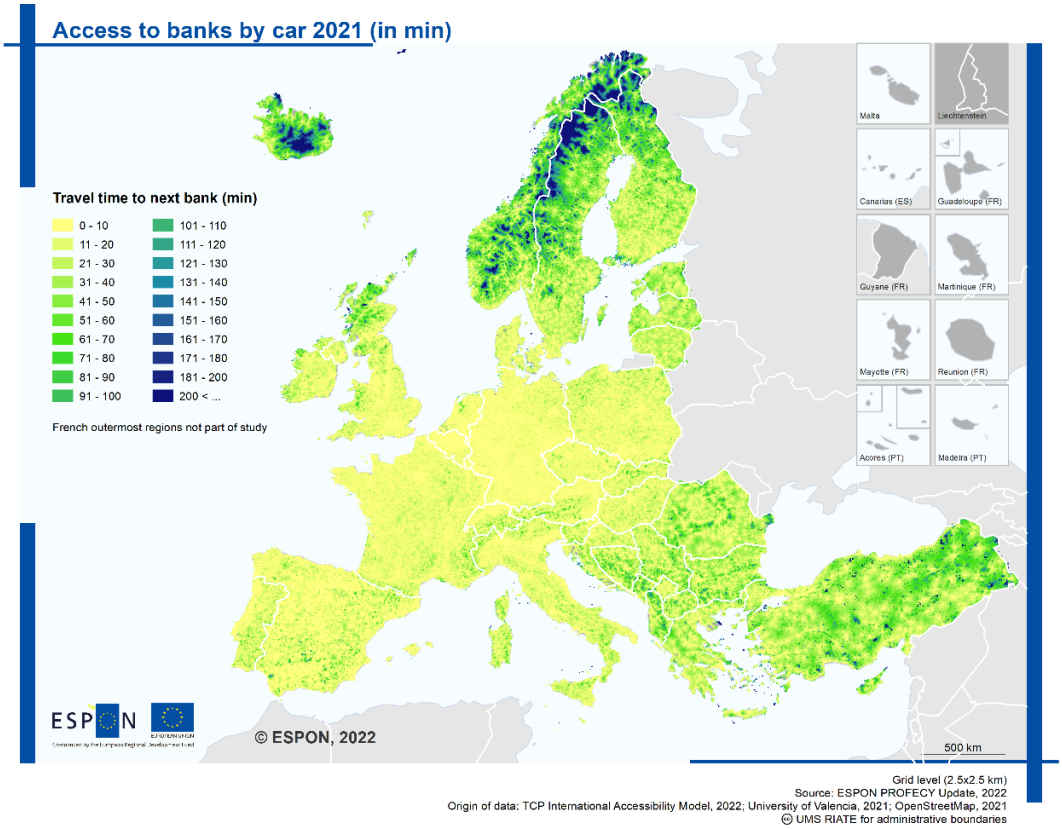
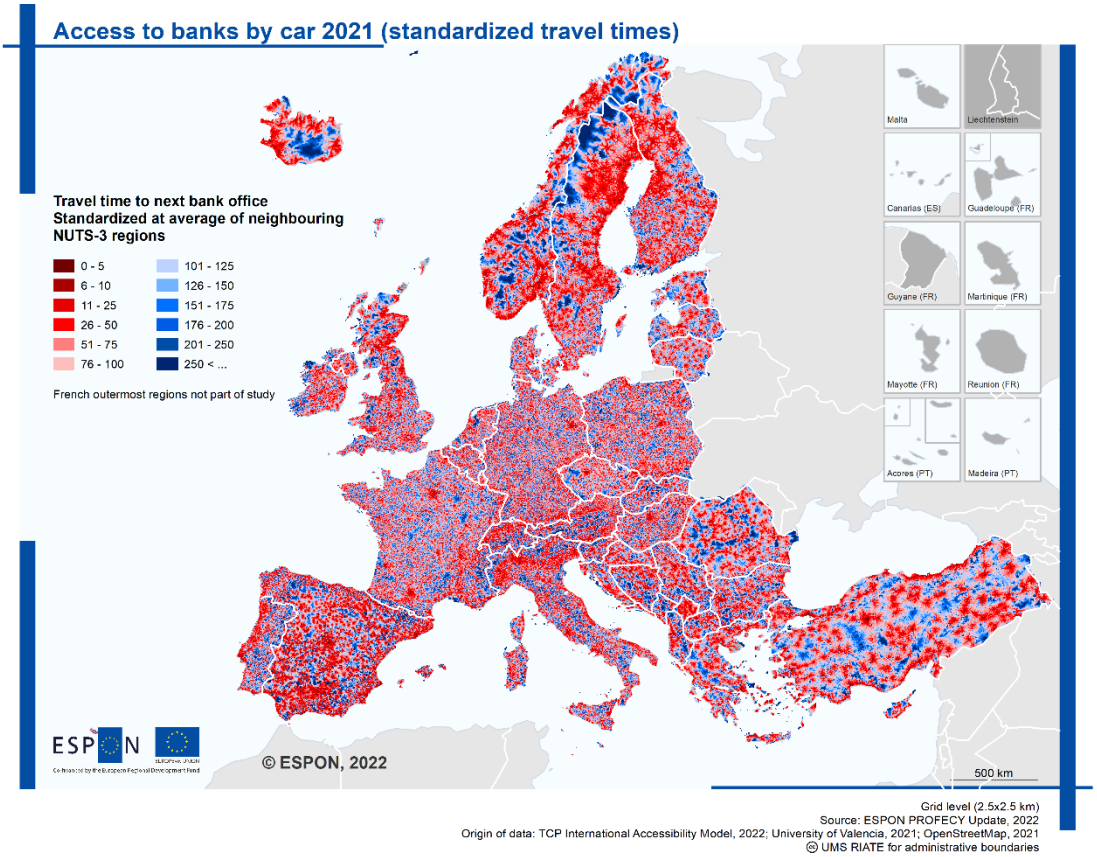
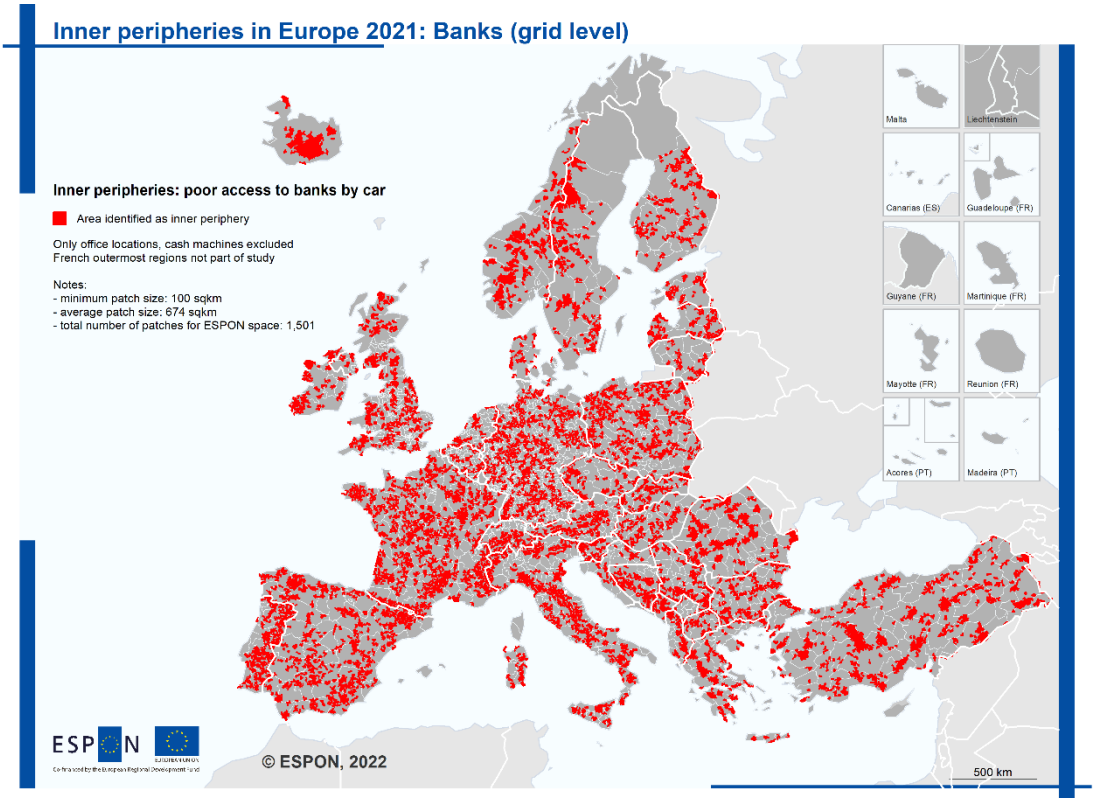


Figure 2-5. Access to banks 2021: standardised travel time by car.



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
© UMS RIATE for administrative boundaries

Figure 2-6. Access to banks 2021: Inner peripheries (grid level).



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
© UMS RIATE for administrative boundaries

Figure 2-7. Access to banks 2021: Overlay of LAU units with IP areas at grid level.

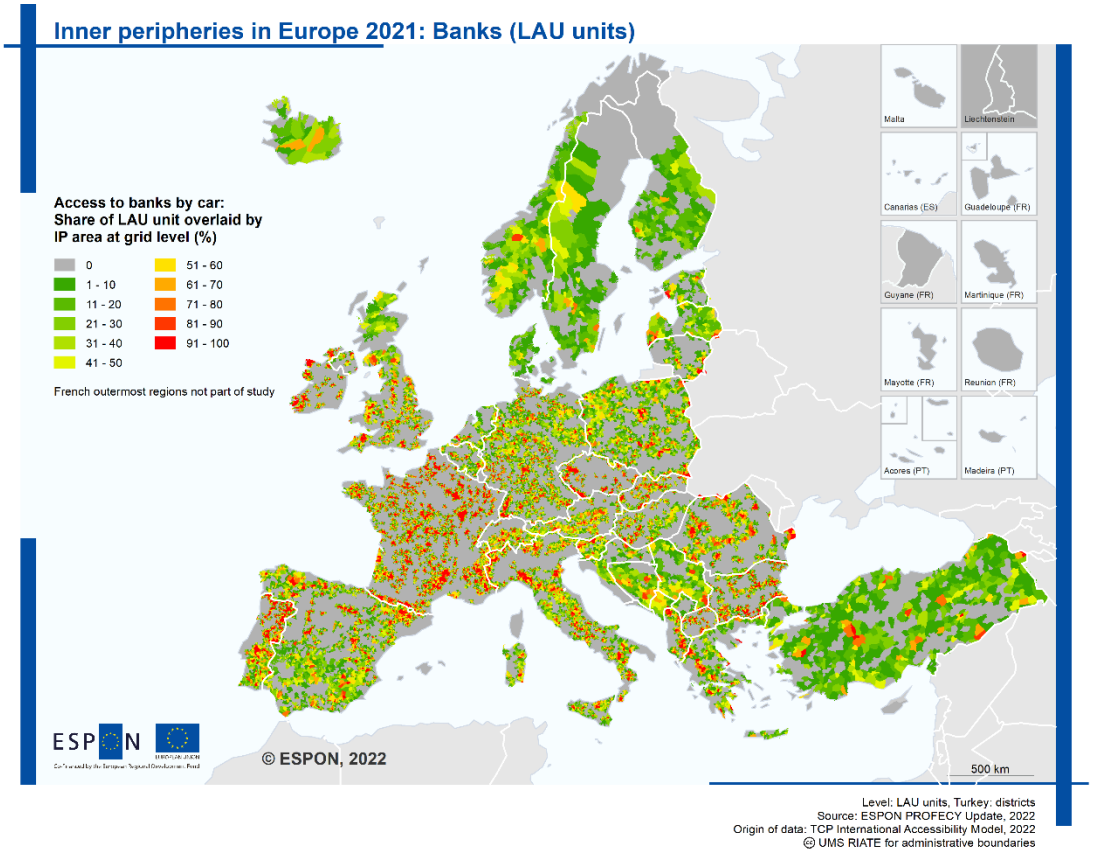


Figure 2-8. Access to banks 2021: Identification of LAU units as inner peripheries.

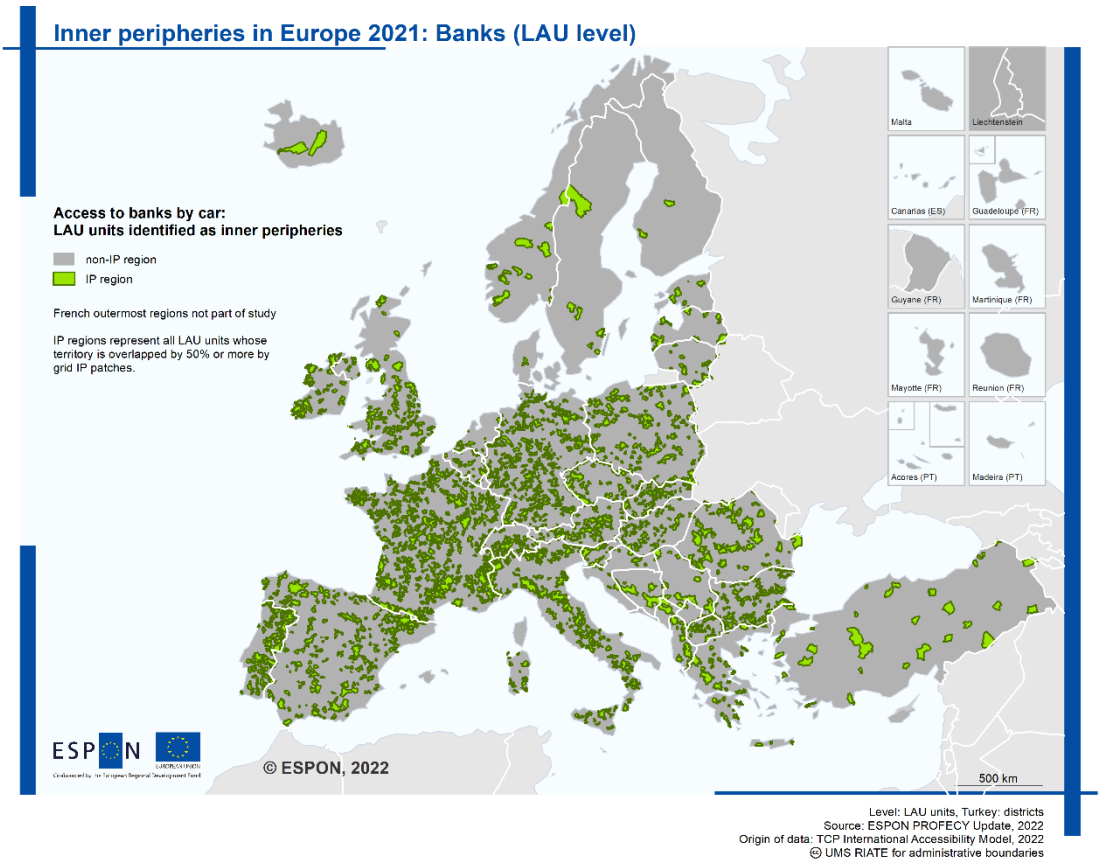


Figure 2-9. Access to banks 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version).

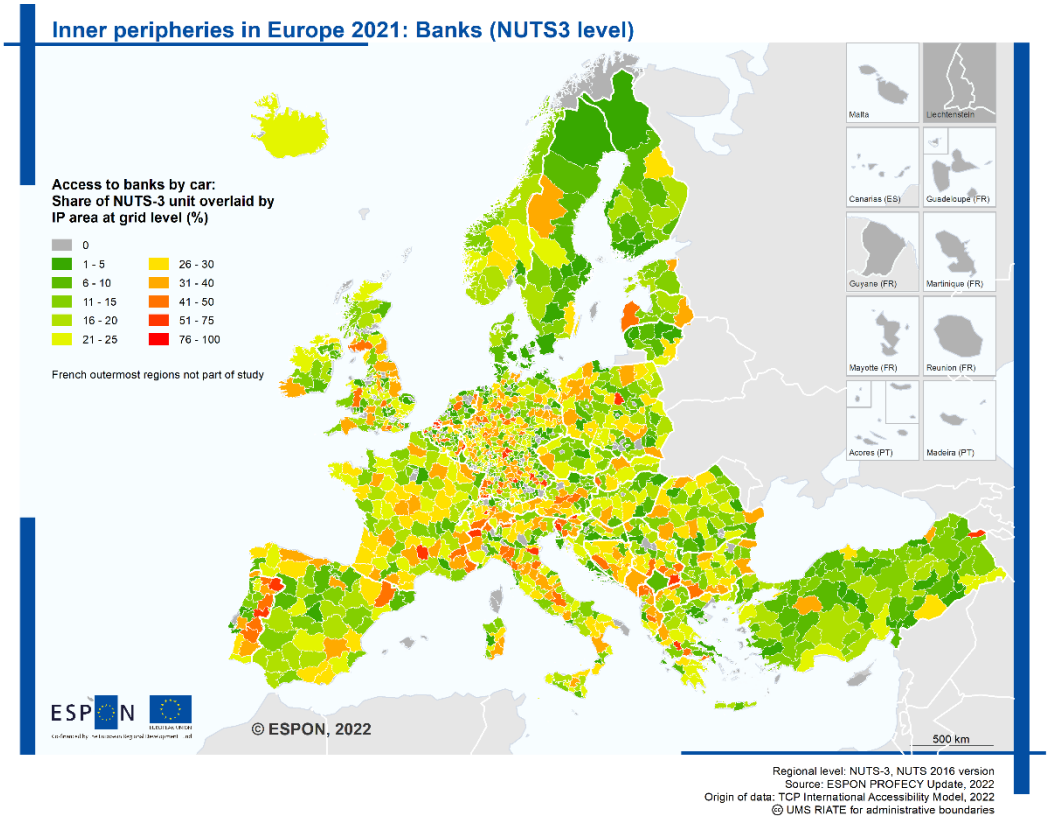


Figure 2-10. Access to banks 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version).

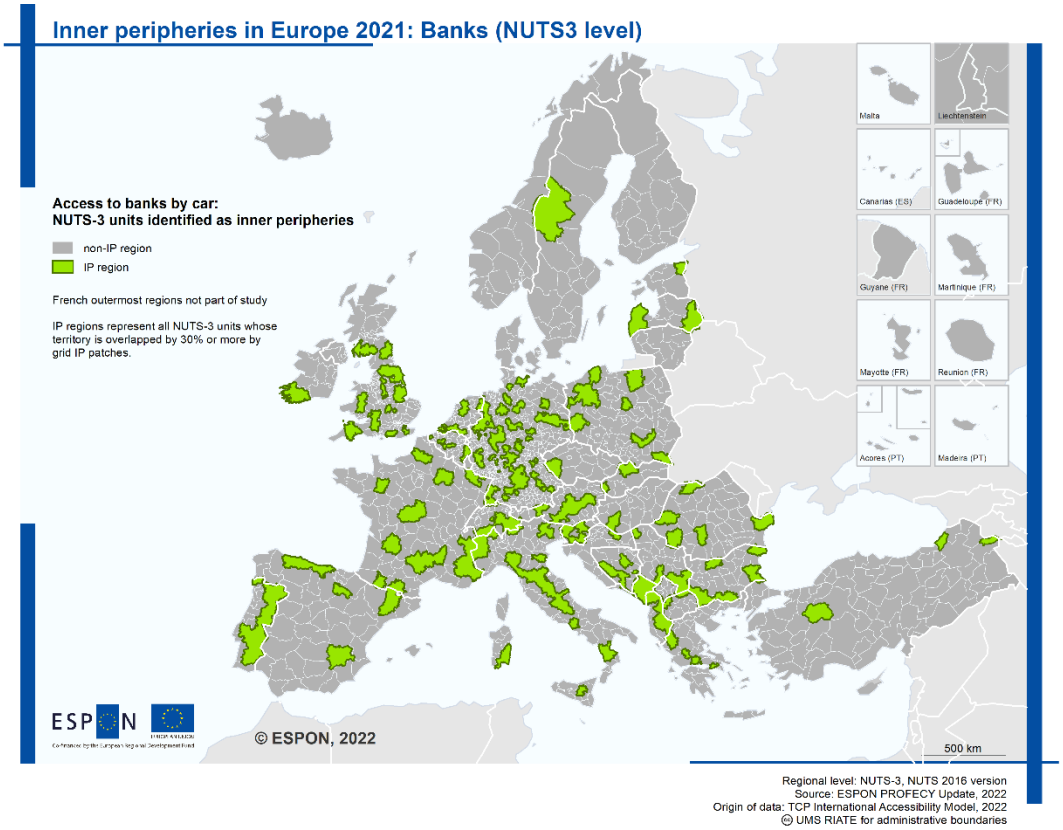


Figure 2-11. Access to banks 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version).

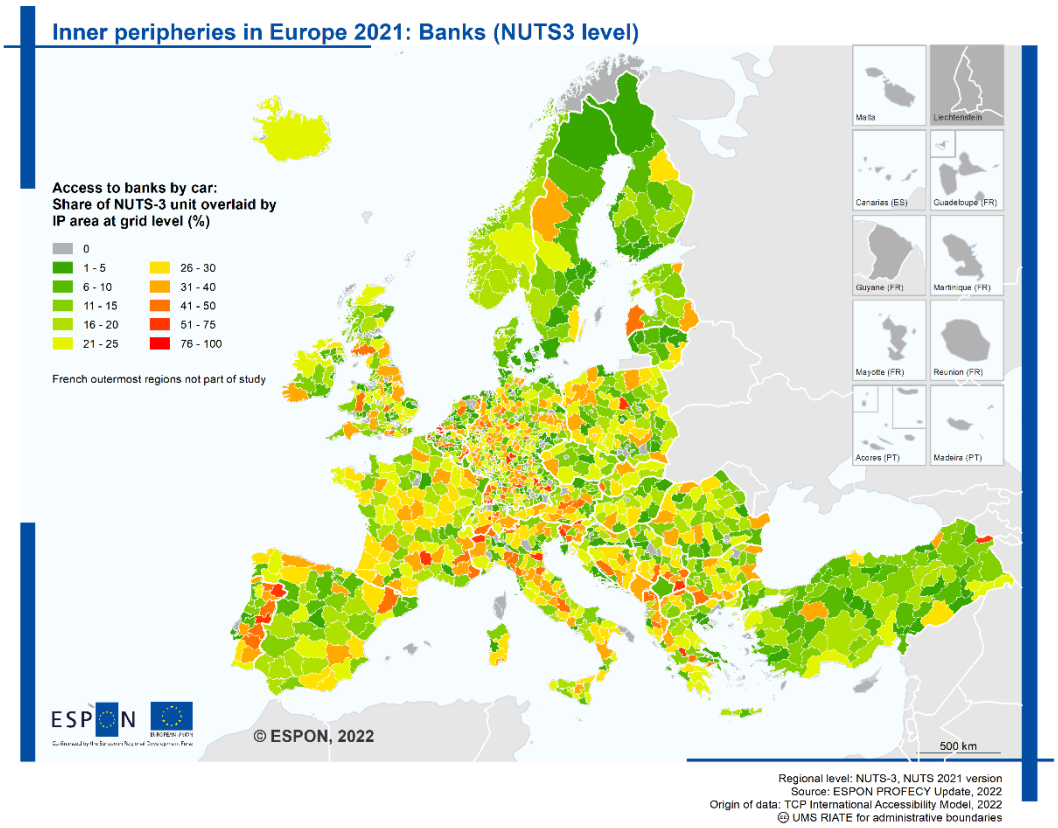


Figure 2-12. Access to banks 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version).

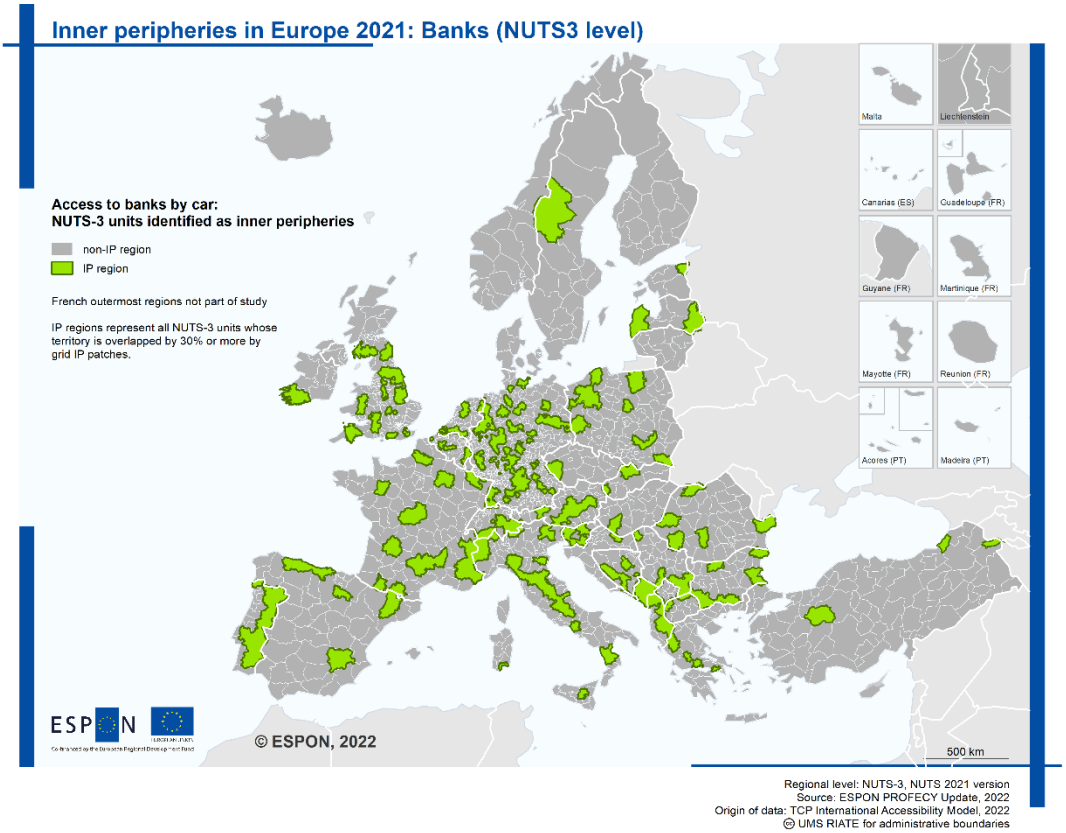


Figure 2-13. Availability of banks within 30 minutes car travel time.

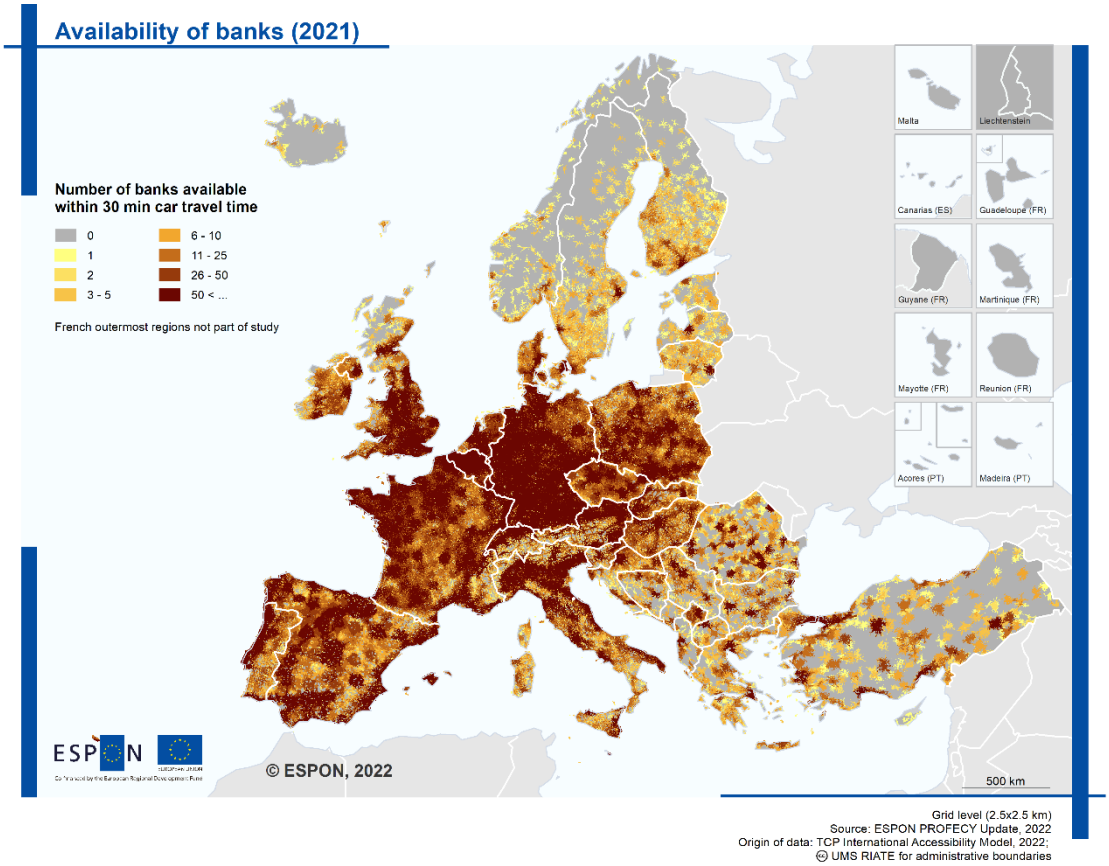
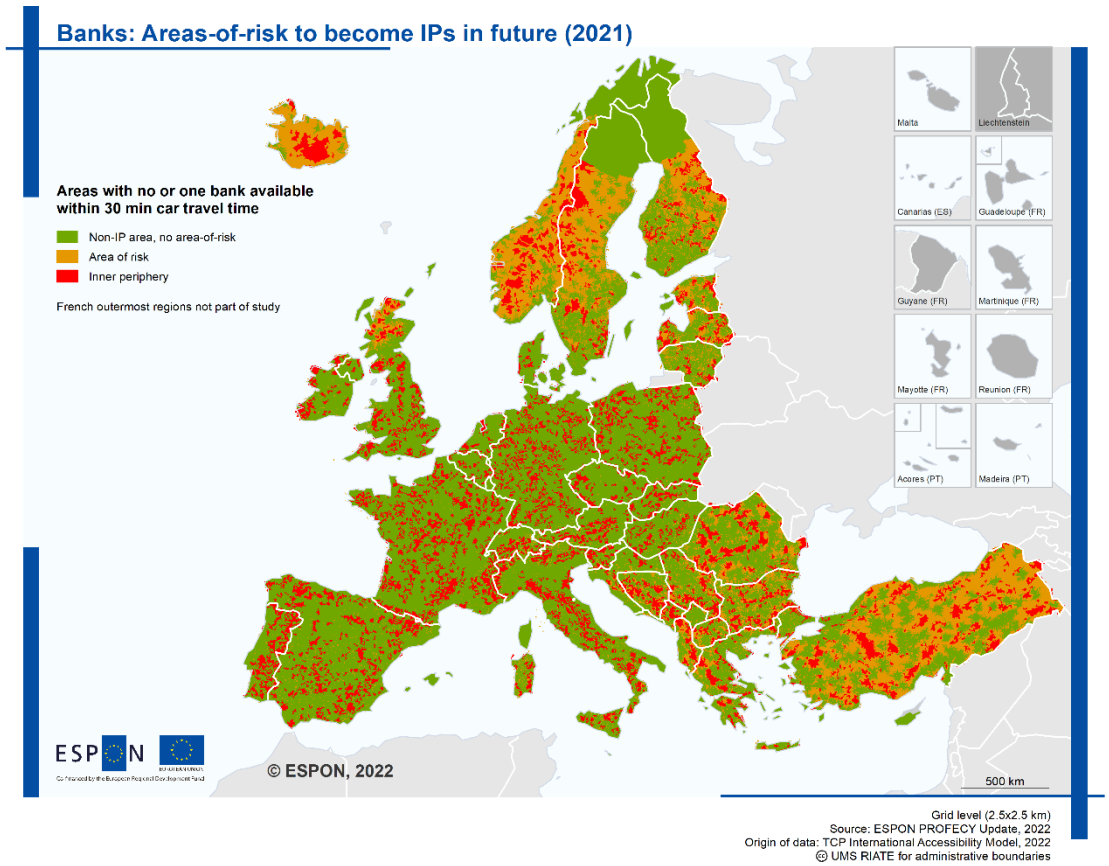


Figure 2-14. Banks: Areas of risk to become IP in future.



2.2 Cinemas

The following maps have been generated as part of the delineation process:

- Cinemas in Europe
- Access to cinemas 2021: Travel time by car
- Access to cinemas 2021: Standardized travel time by car
- Access to cinemas 2021: Delineation of inner peripheries at grid level
- Access to cinemas 2021: Overlay of LAU units with IP areas at grid level
- Access to cinemas 2021: Identification of LAU units as inner peripheries
- Access to cinemas 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version)
- Access to cinemas 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version)
- Access to cinemas 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version)
- Access to cinemas 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version)
- Availability of cinemas within 45 minutes car travel time
- Cinemas: Areas of risk to become IP in future

Figure 2-15. Cinemas in Europe.

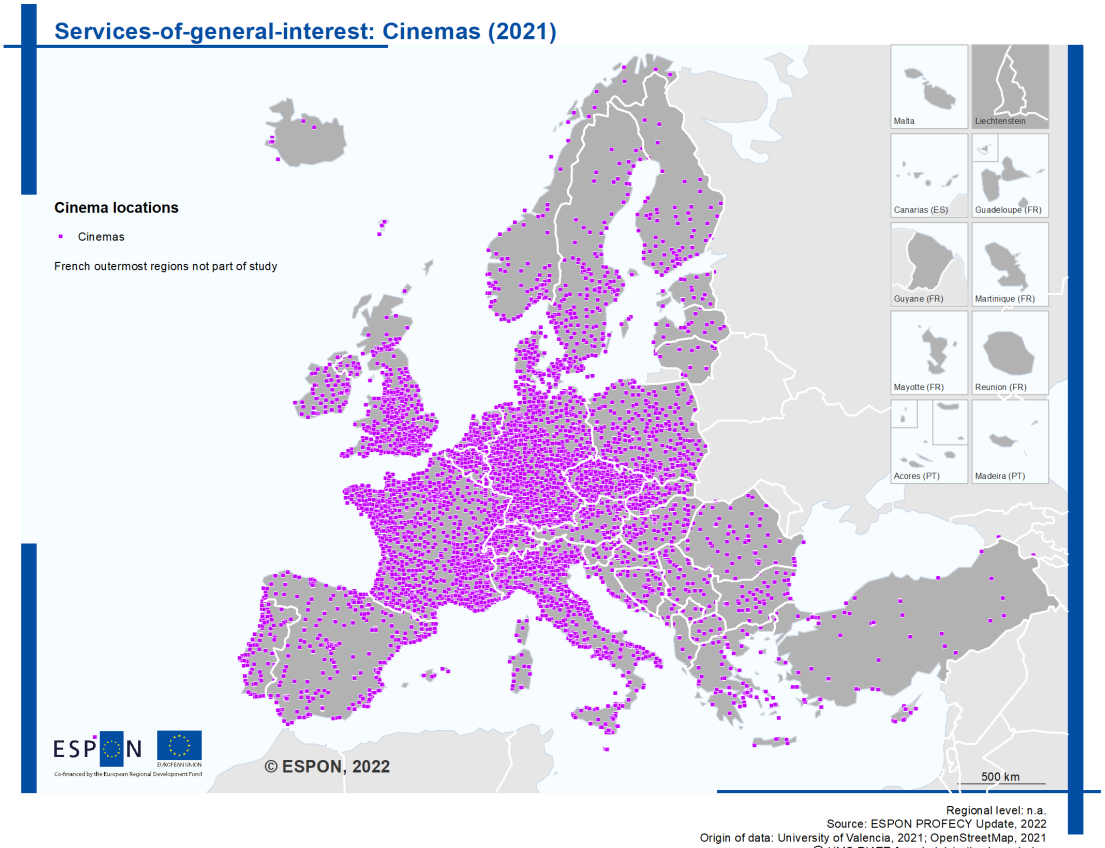


Figure 2-16. Access to cinemas 2021: travel time by car.

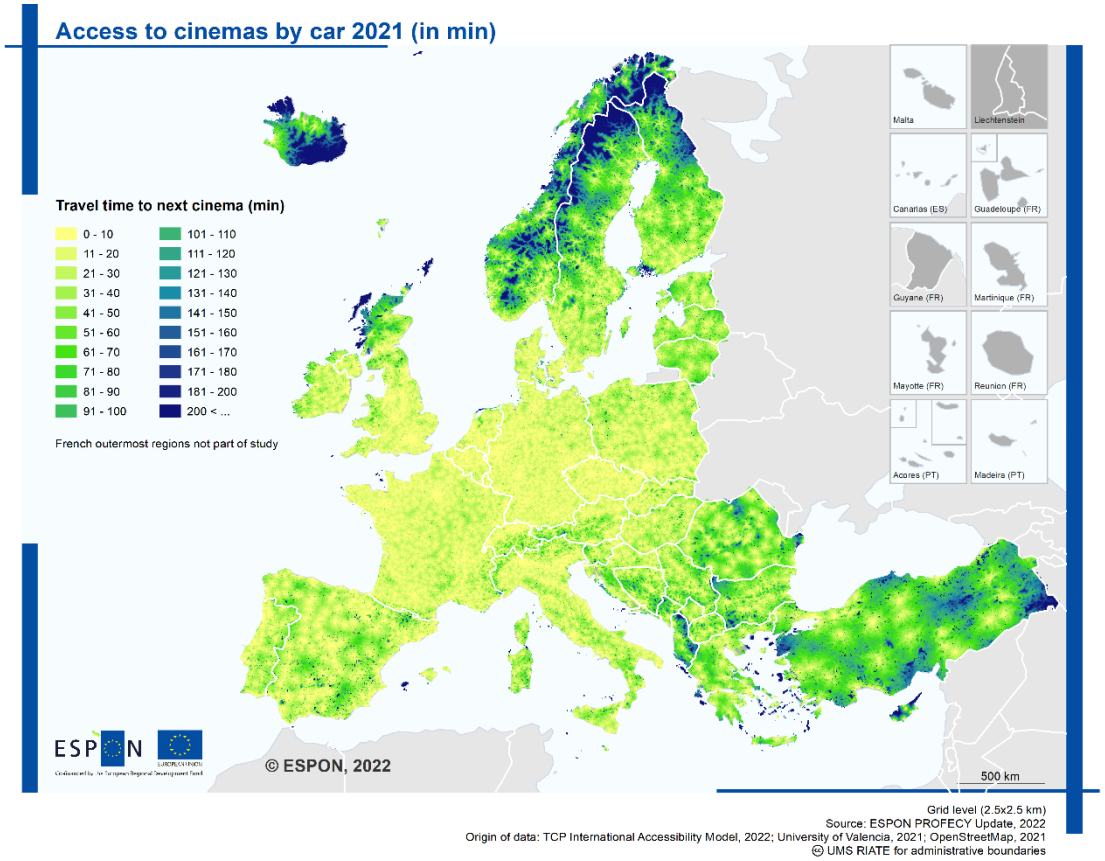
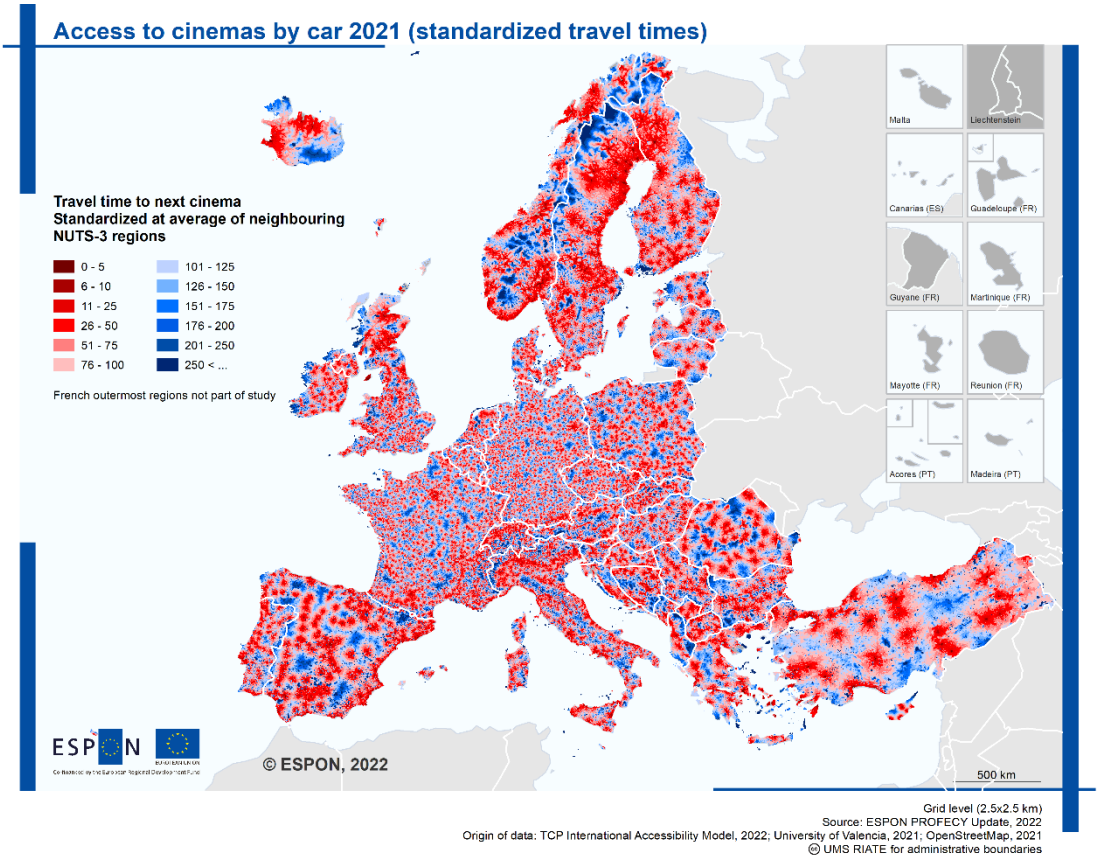
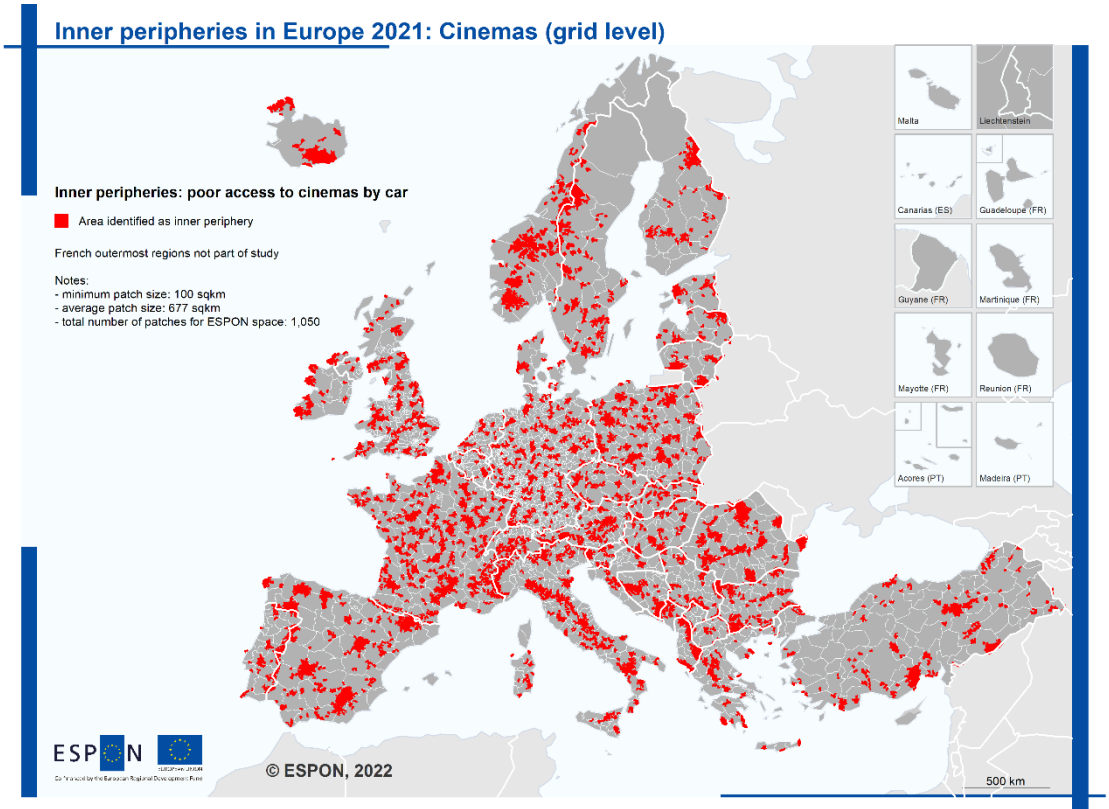


Figure 2-17. Access to cinemas 2021: standardized travel time by car.



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
(c) UMS RIATE for administrative boundaries

Figure 2-18. Access to cinemas 2021: Inner peripheries (grid level).



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
(c) UMS RIATE for administrative boundaries

Figure 2-19. Access to cinemas 2021: Overlay of LAU units with IP areas at grid level.

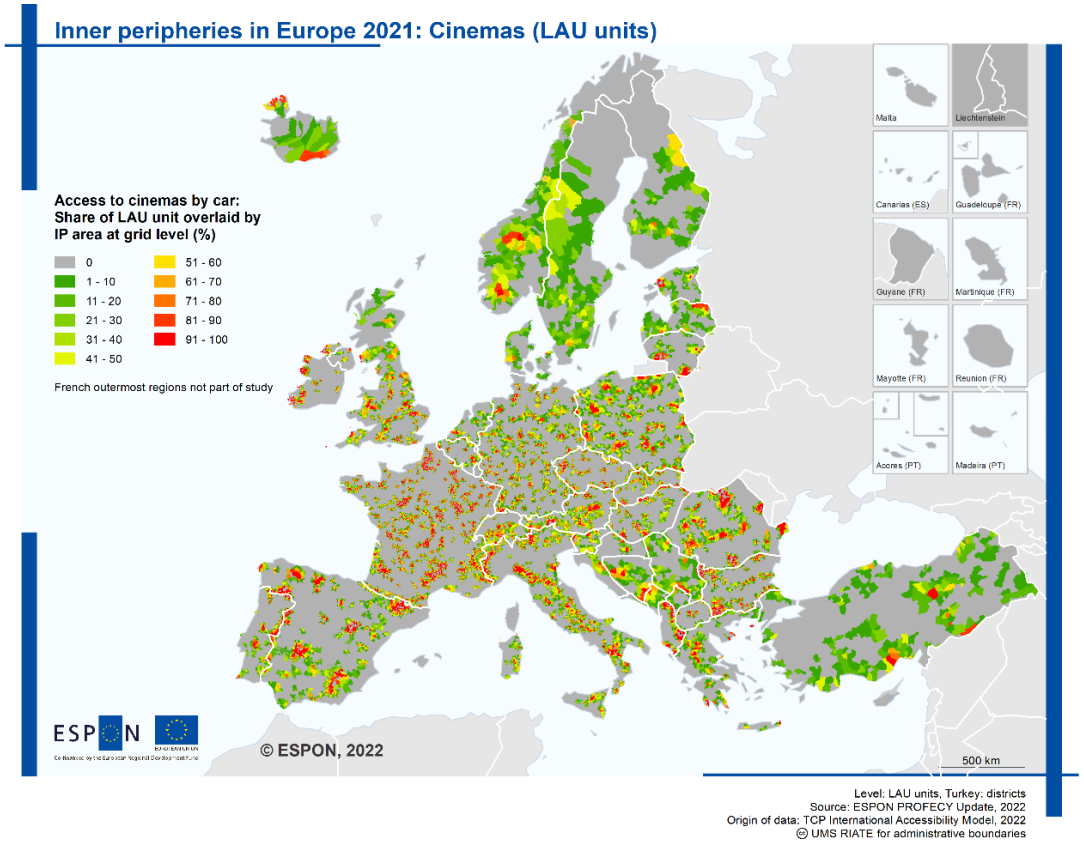


Figure 2-20. Access to cinemas 2021: Identification of LAU units as inner peripheries.

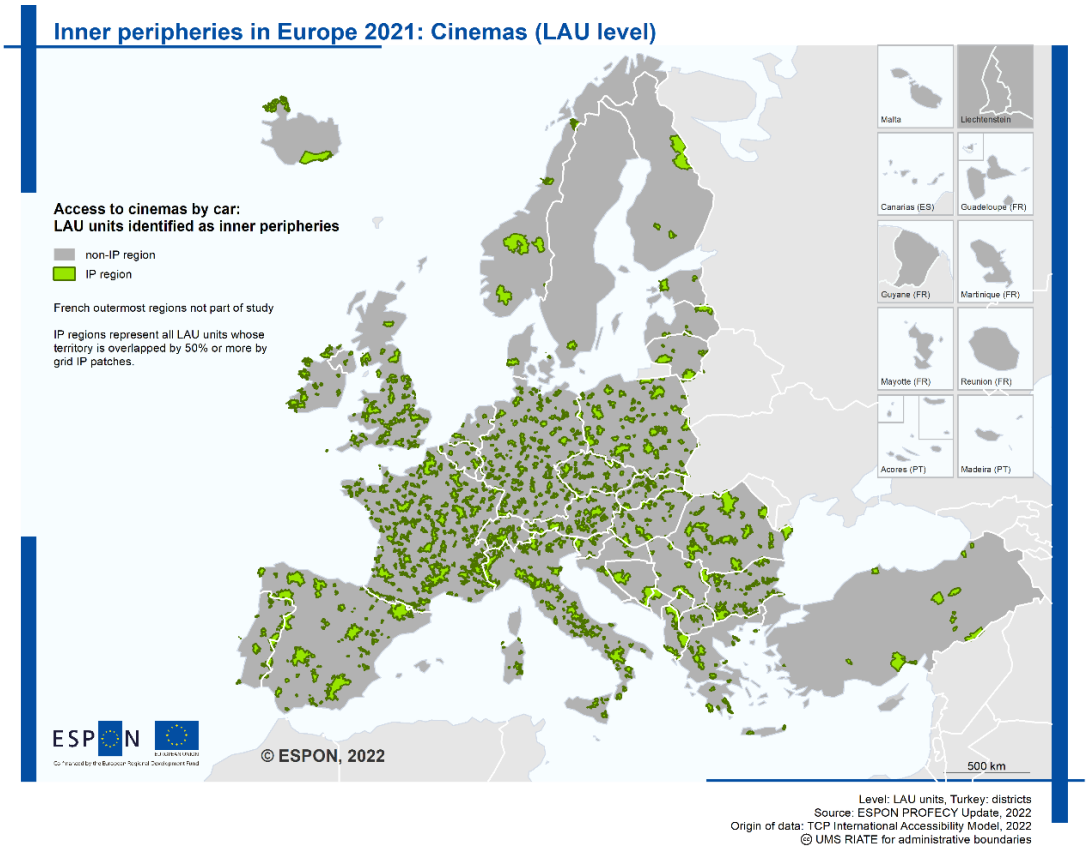


Figure 2-21. Access to cinemas 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version).

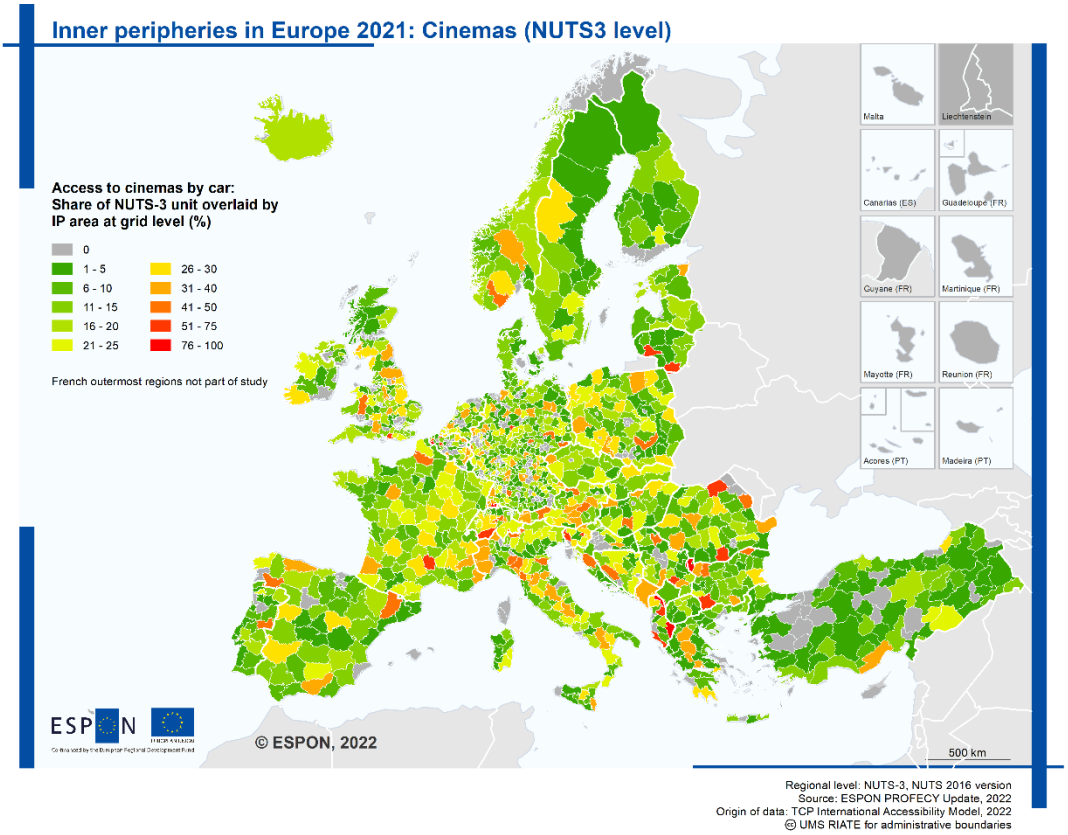


Figure 2-22. Access to cinemas 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version).

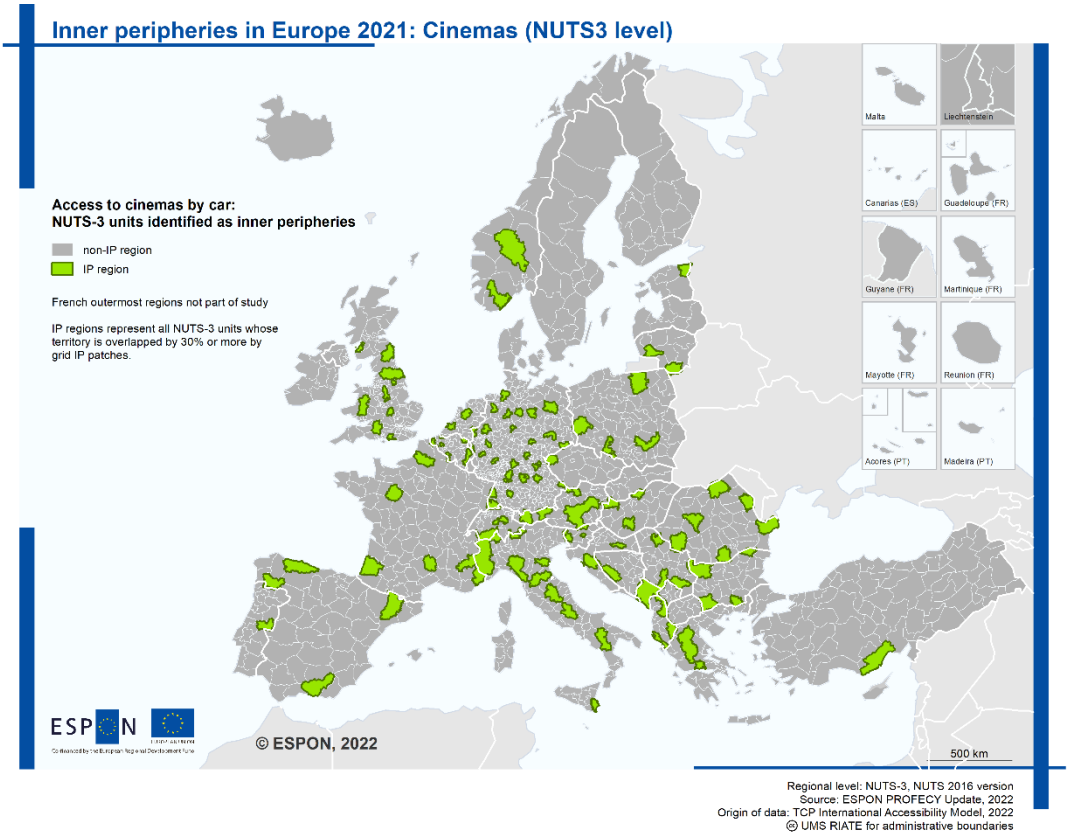


Figure 2-23. Access to cinemas 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version).

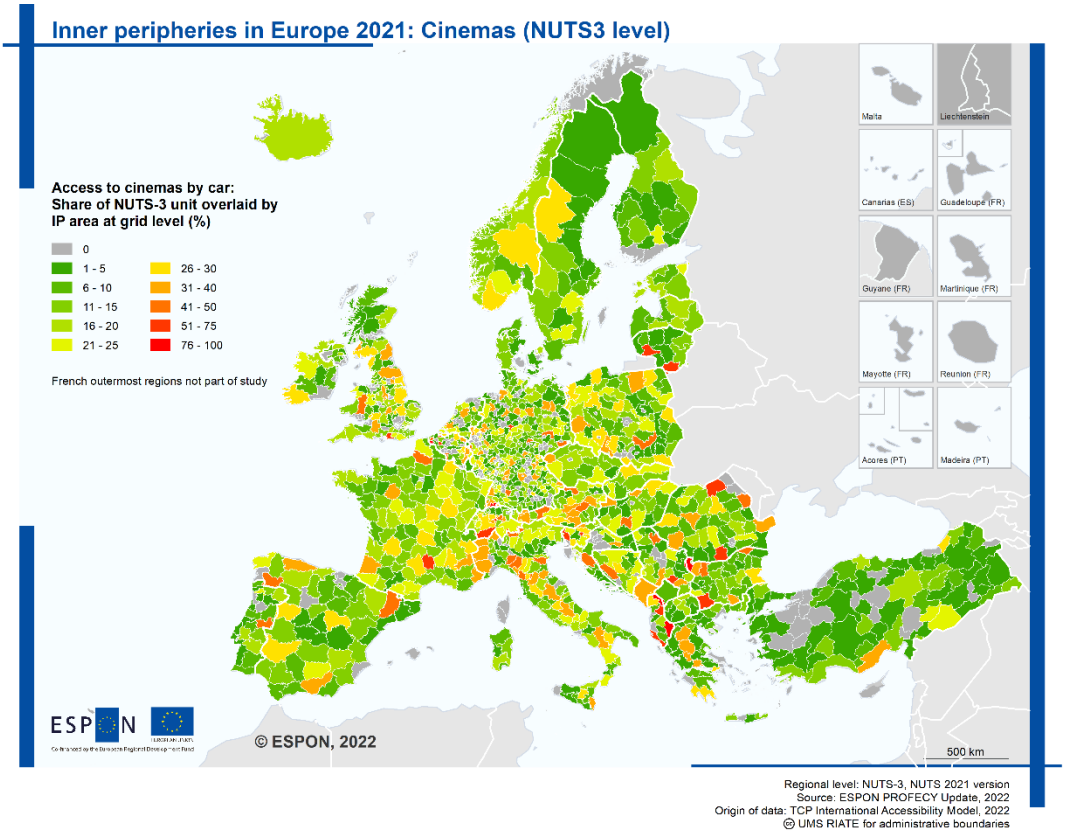


Figure 2-24. Access to cinemas 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version).

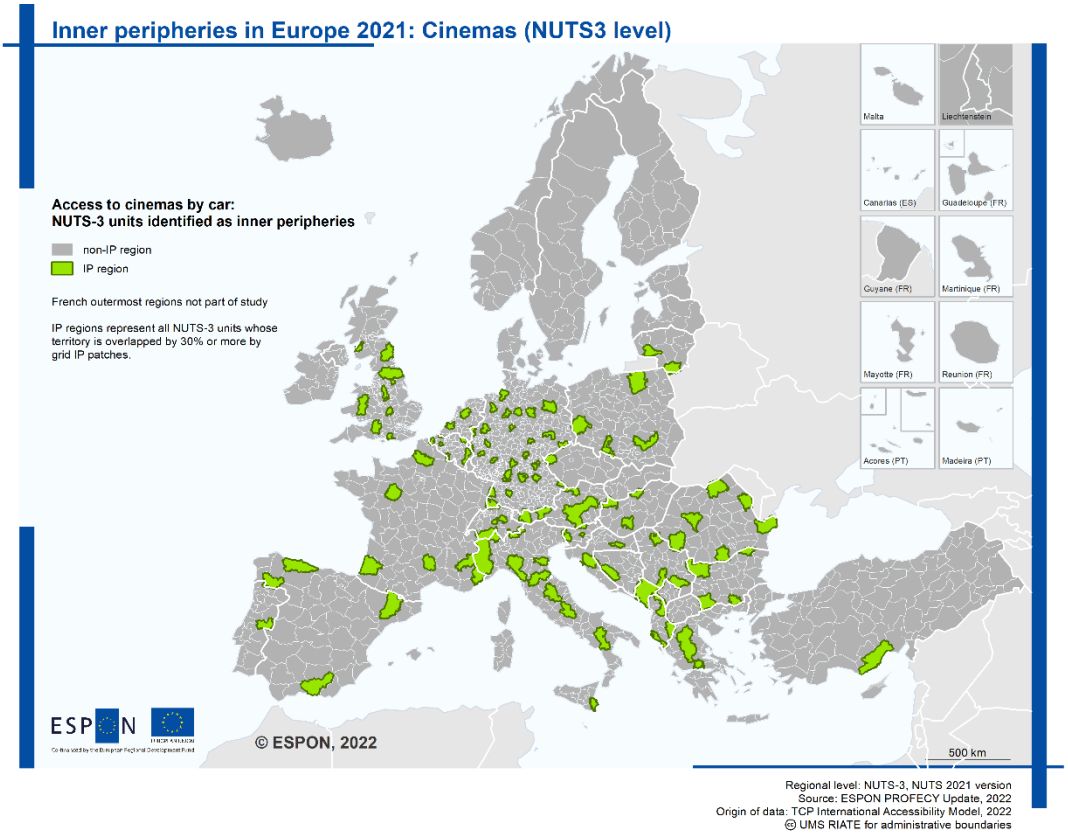


Figure 2-25. Availability of cinemas within 45 minutes car travel time.

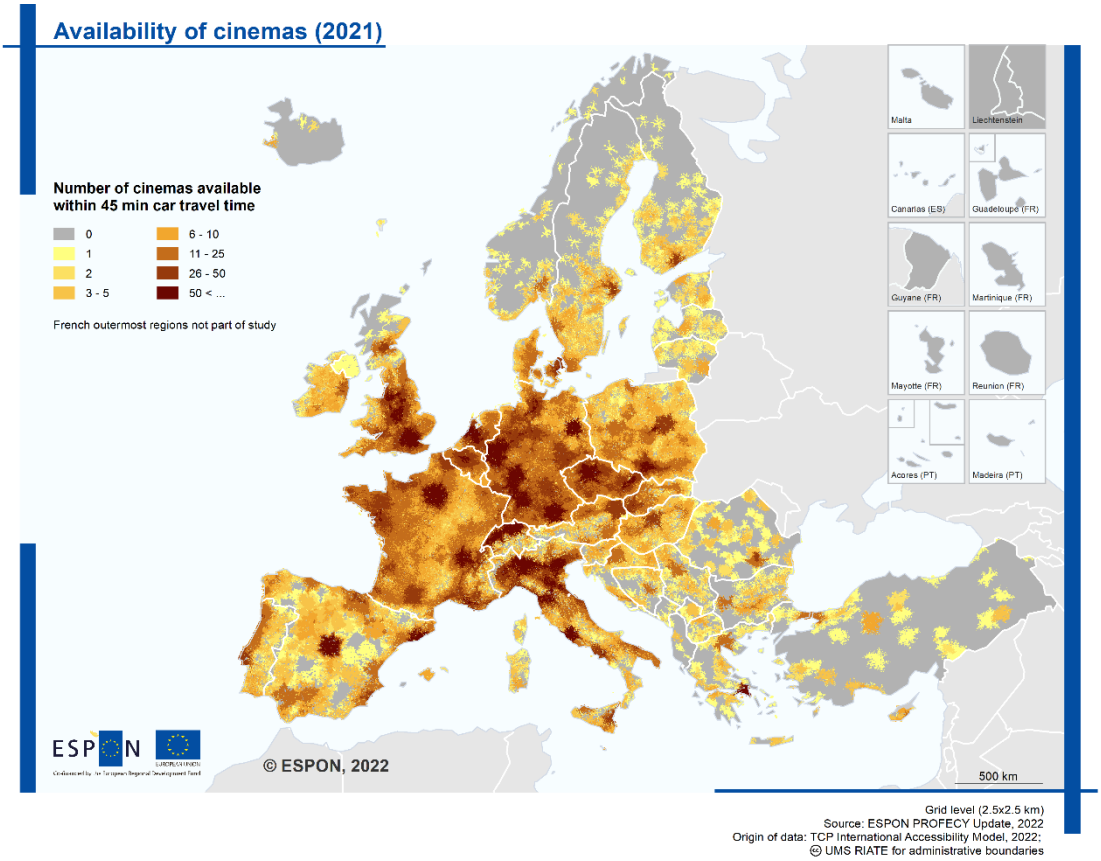
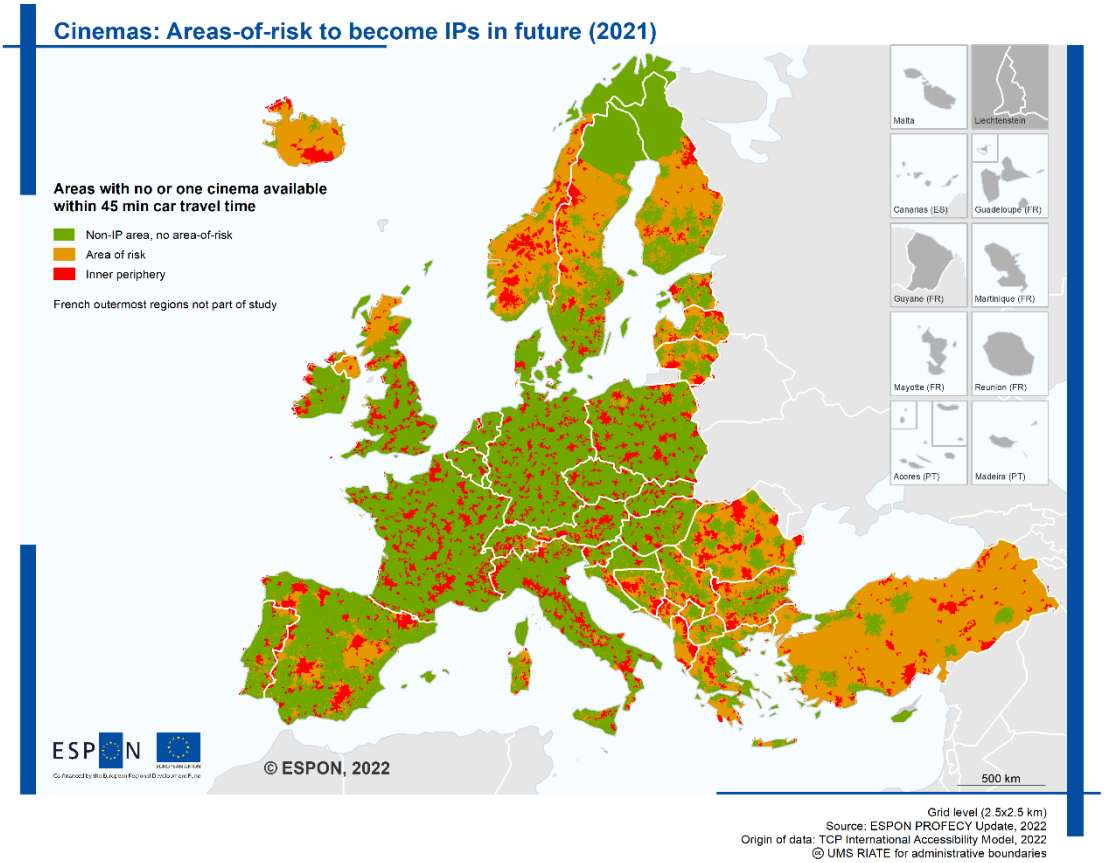


Figure 2-26. Cinemas: Areas of risk to become IP in future.



2.3 Health care

The following maps have been generated as part of the delineation process:

- Doctors in Europe
- Density of doctors in Europe (2021) (2016 NUTS version)
- Density of doctors in Europe (2021) (2021 NUTS version)
- Access to doctors 2021: Travel time by car
- Access to doctors 2021: Standardized travel time by car
- Access to doctors 2021: Delineation of inner peripheries at grid level
- Access to doctors 2021: Overlay of LAU units with IP areas at grid level
- Access to doctors 2021: Identification of LAU units as inner peripheries
- Access to doctors 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version)
- Access to doctors 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version)
- Access to doctors 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version)
- Access to doctors 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version)
- Availability of doctors within 30 minutes car travel time
- Doctors: Areas of risk to become IP in future
- Hospitals in Europe
- Access to hospitals 2021: Travel time by car
- Access to hospitals 2021: Standardized travel time by car
- Access to hospitals 2021: Delineation of inner peripheries at grid level
- Access to hospitals 2021: Overlay of LAU units with IP areas at grid level
- Access to hospitals 2021: Identification of LAU units as inner peripheries
- Access to hospitals 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version)
- Access to hospitals 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version)
- Access to hospitals 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version)
- Access to hospitals 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version)
- Availability of hospitals within 60 minutes car travel time
- Hospitals: Areas of risk to become IP in future
- Pharmacies in Europe
- Density of pharmacies in Europe (2021) (2016 NUTS version)
- Density of pharmacies in Europe (2021) (2021 NUTS version)
- Access to pharmacies 2021: Travel time by car
- Access to pharmacies 2021: Standardized travel time by car
- Access to pharmacies 2021: Delineation of inner peripheries at grid level
- Access to pharmacies 2021: Overlay of LAU units with IP areas at grid level
- Access to pharmacies 2021: Identification of LAU units as inner peripheries
- Access to pharmacies 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version)
- Access to pharmacies 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version)
- Access to pharmacies 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version)
- Access to pharmacies 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version)
- Availability of pharmacies within 15 minutes car travel time
- Pharmacies: Areas of risk to become IP in future

Doctors:

Only general practitioners (GPs) and general surgeries have been considered. Specialized doctors were excluded. Surgeries (with several GPs) have been assigned to doctors rather than to hospitals. Note that other studies may treat surgeries differently, by assigning them to hospitals. As further information about the services offered in surgeries (such as only day-care services, or services including overnight stays) were not available for entire ESPON space, surgeries were assigned to doctors rather than to hospitals.

Still, for some countries (Albania, Bosnia-Herzegovina, Greece, Finland, Latvia, Lithuania, Makedonia, Malta, Romania, Serbia, Turkey) the OSM database seems incomplete. Alternative data source providing complete address information for all doctors have not been found. In PROFECY, these countries were excluded from the maps; here, we are still showing them despite all doubts regarding completeness of the input data.

Hospitals:

Similar to doctors, only general hospitals have been considered. Specialized hospitals (such as rehabilitation centres, wellness clinics, sanatoriums, hospices etc.) have been excluded.

Figure 2-27. Doctors in Europe.

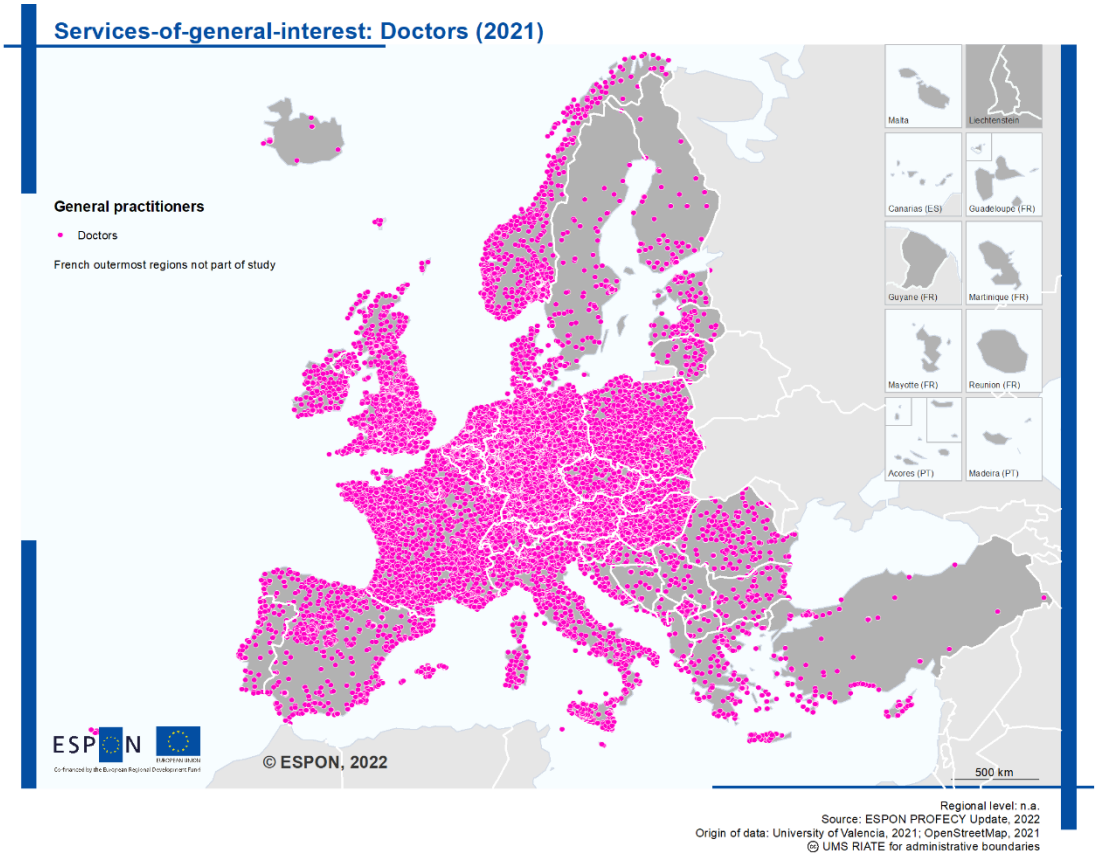


Figure 2-28. Density of Doctors in Europe (2021) (2016 NUTS version).

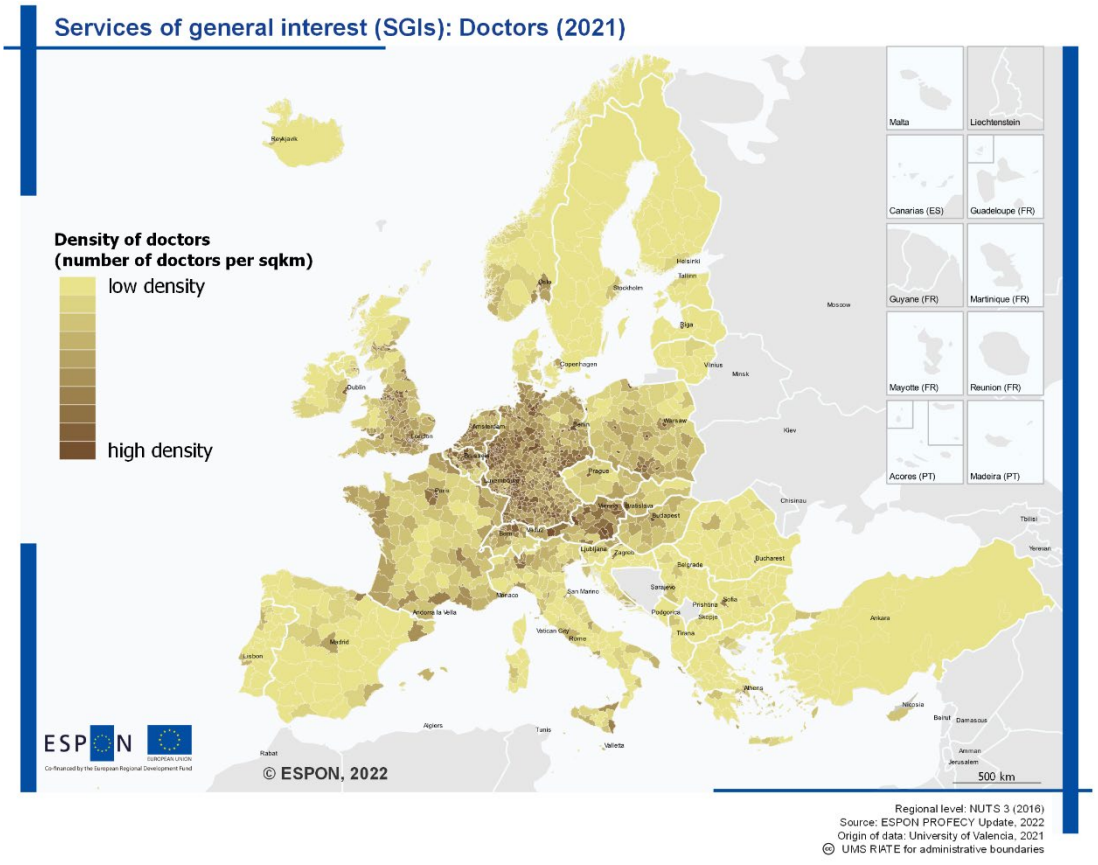


Figure 2-29. Density of Doctors in Europe (2021) (2021 NUTS version).

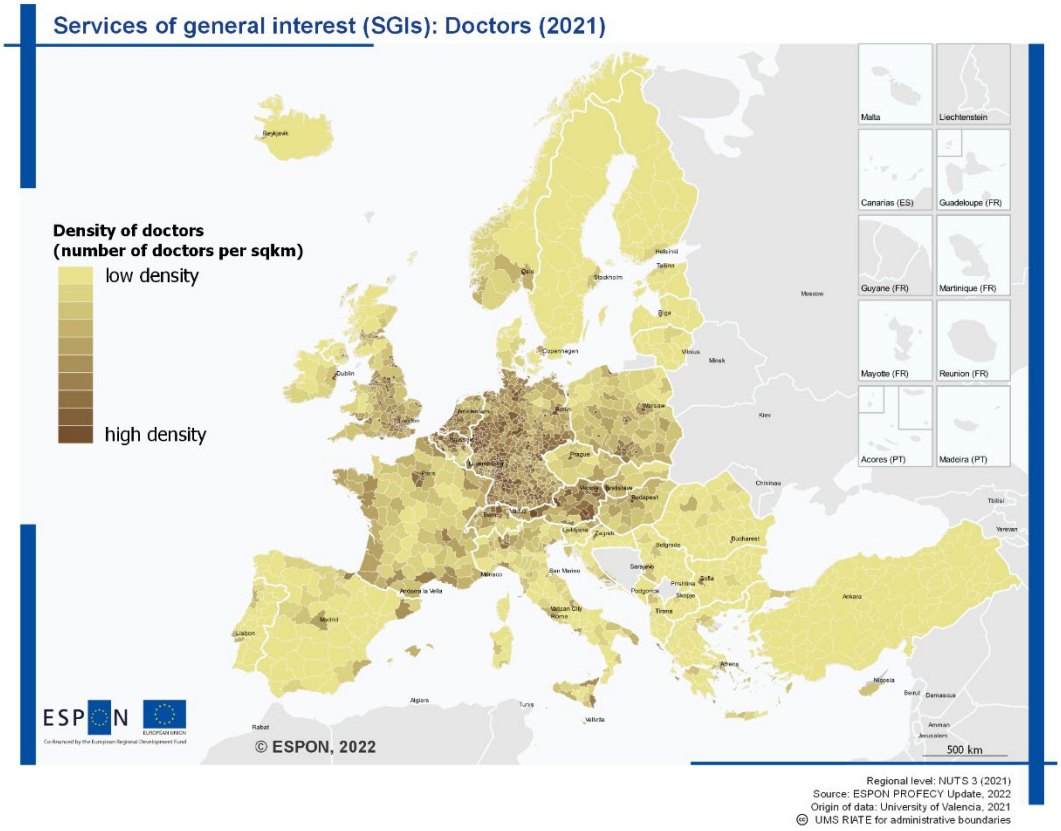


Figure 2-30. Access to doctors 2021: travel time by car.

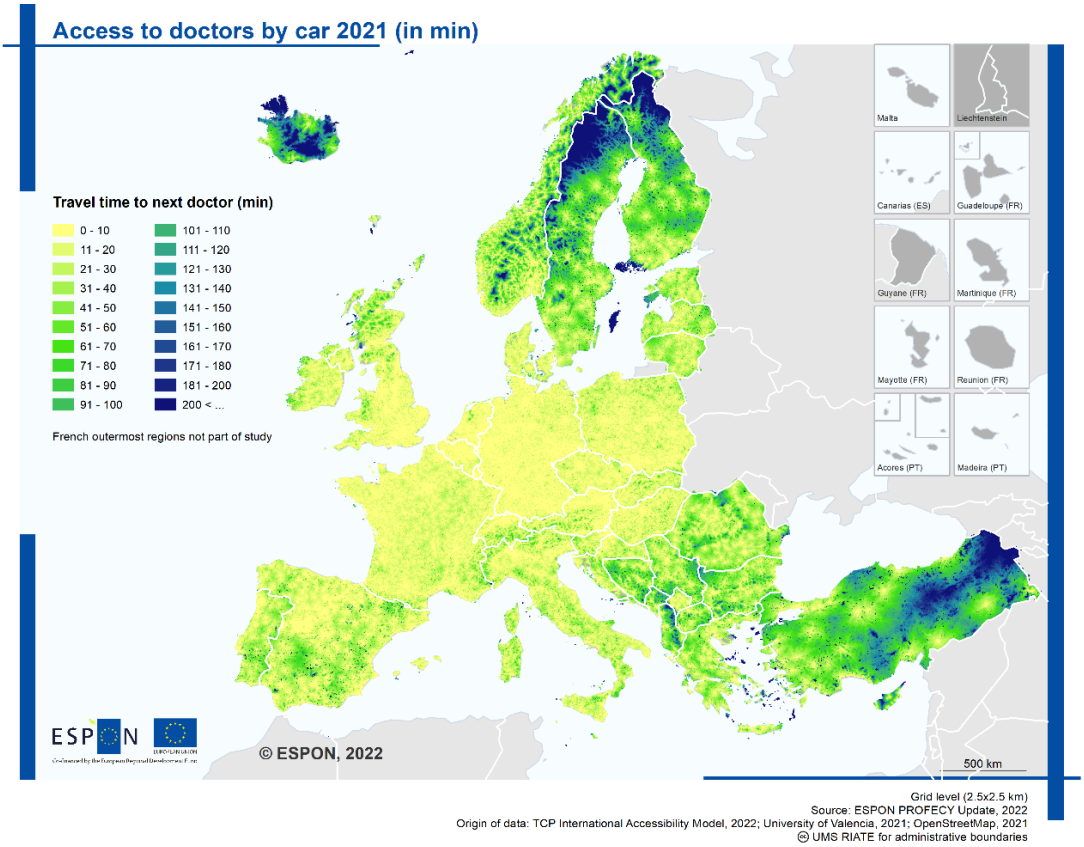
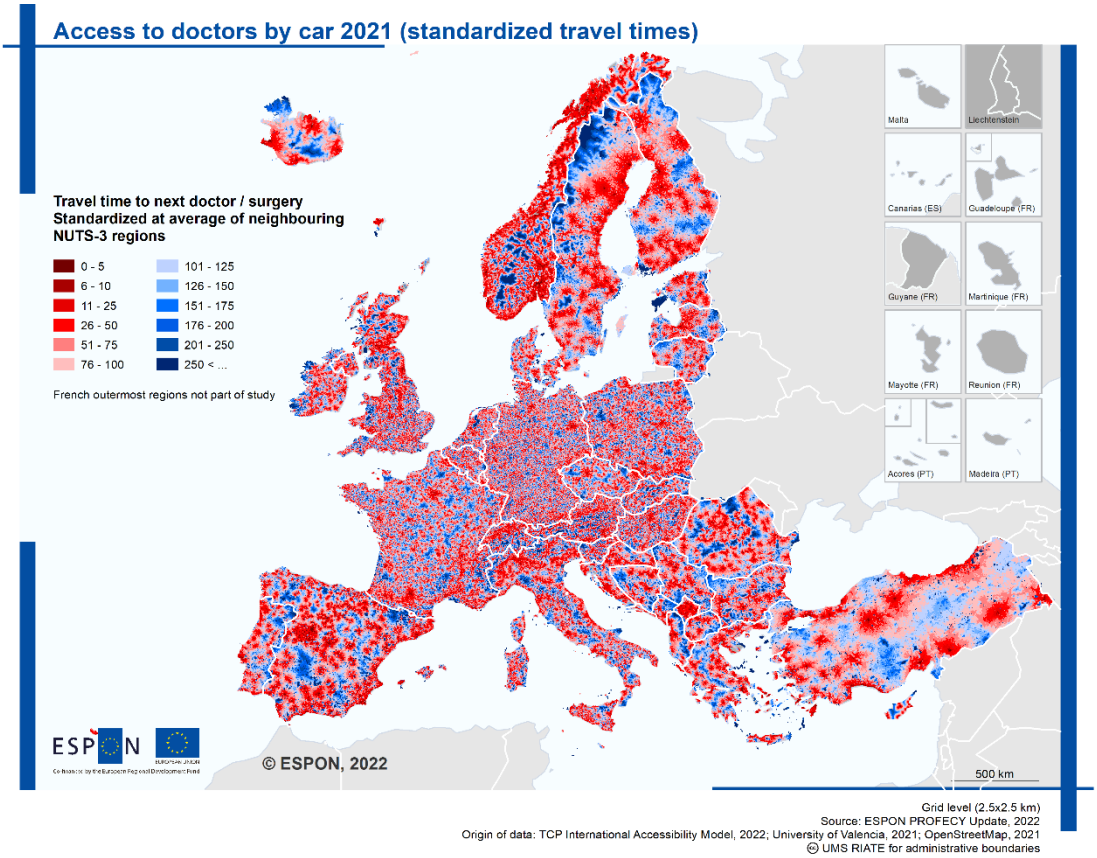
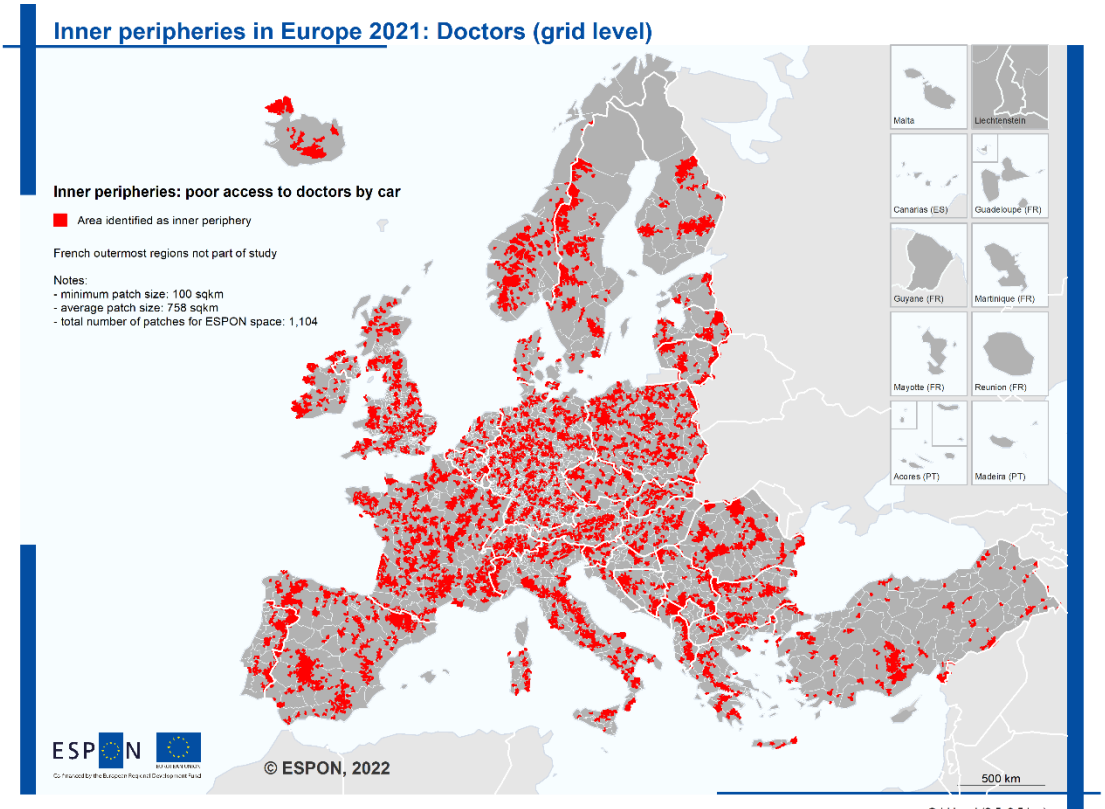


Figure 2-31. Access to doctors 2021: standardized travel time by car.



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
© UMS RIATE for administrative boundaries

Figure 2-32. Access to doctors 2021: Inner peripheries (grid level).



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
© UMS RIATE for administrative boundaries

Figure 2-33. Access to doctors 2021: Overlay of LAU units with IP areas at grid level.

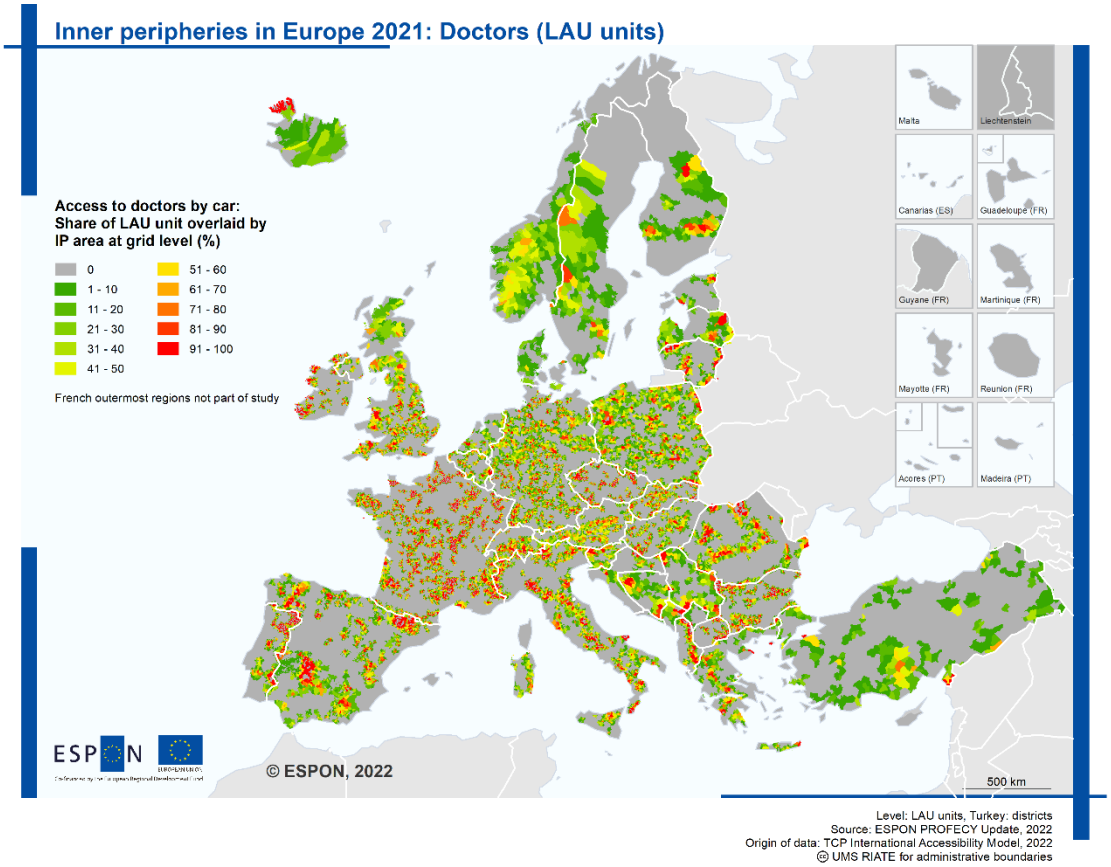


Figure 2-34. Access to doctors 2021: Identification of LAU units as inner peripheries.

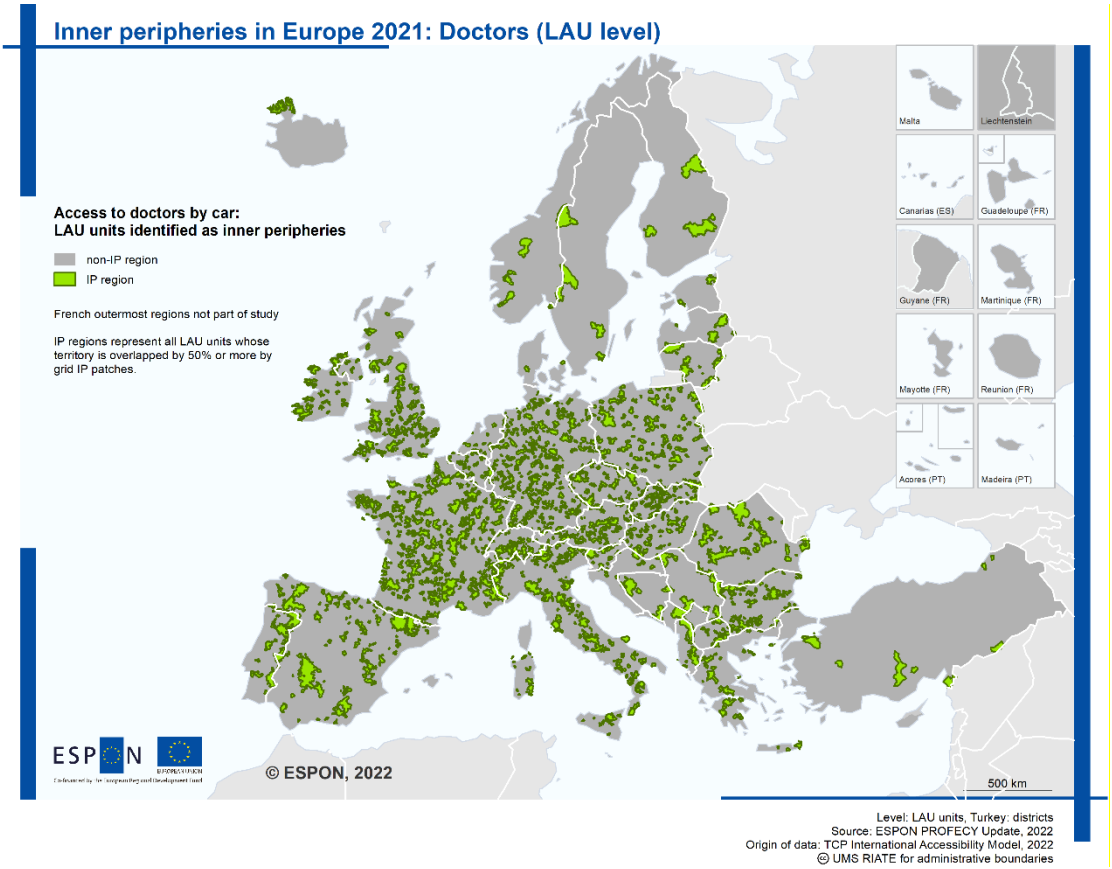


Figure 2-35. Access to doctors 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version).

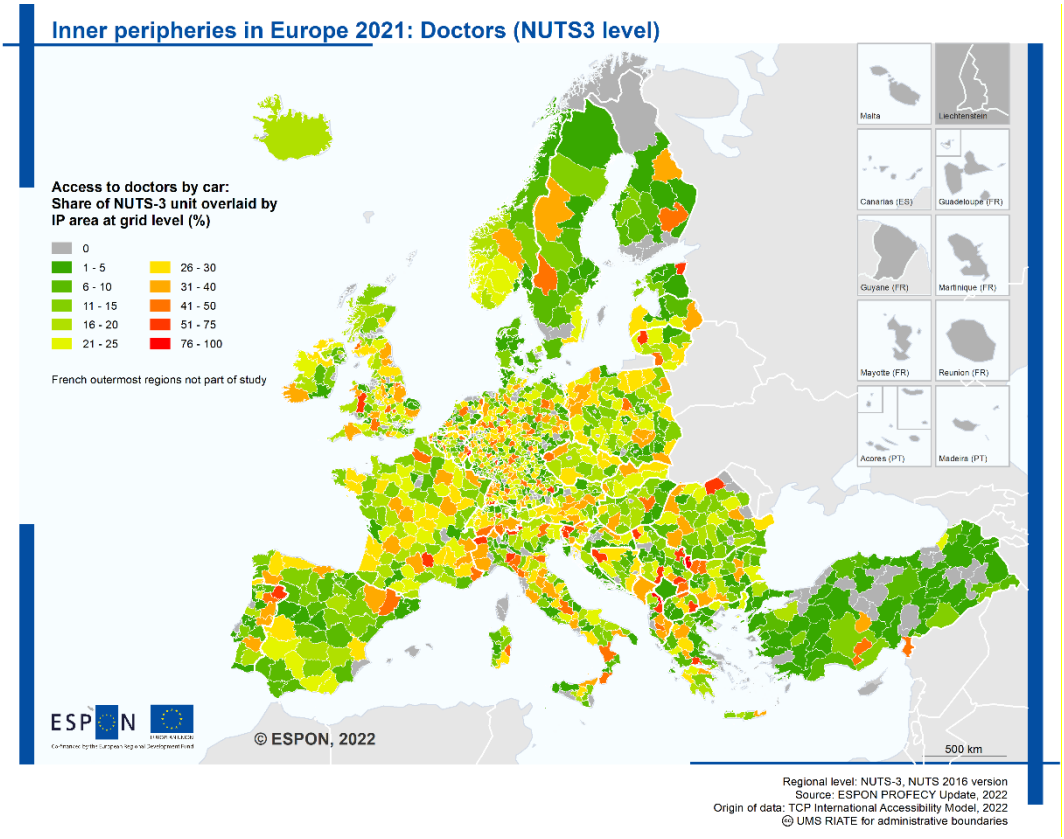


Figure 2-36. Access to doctors 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version).

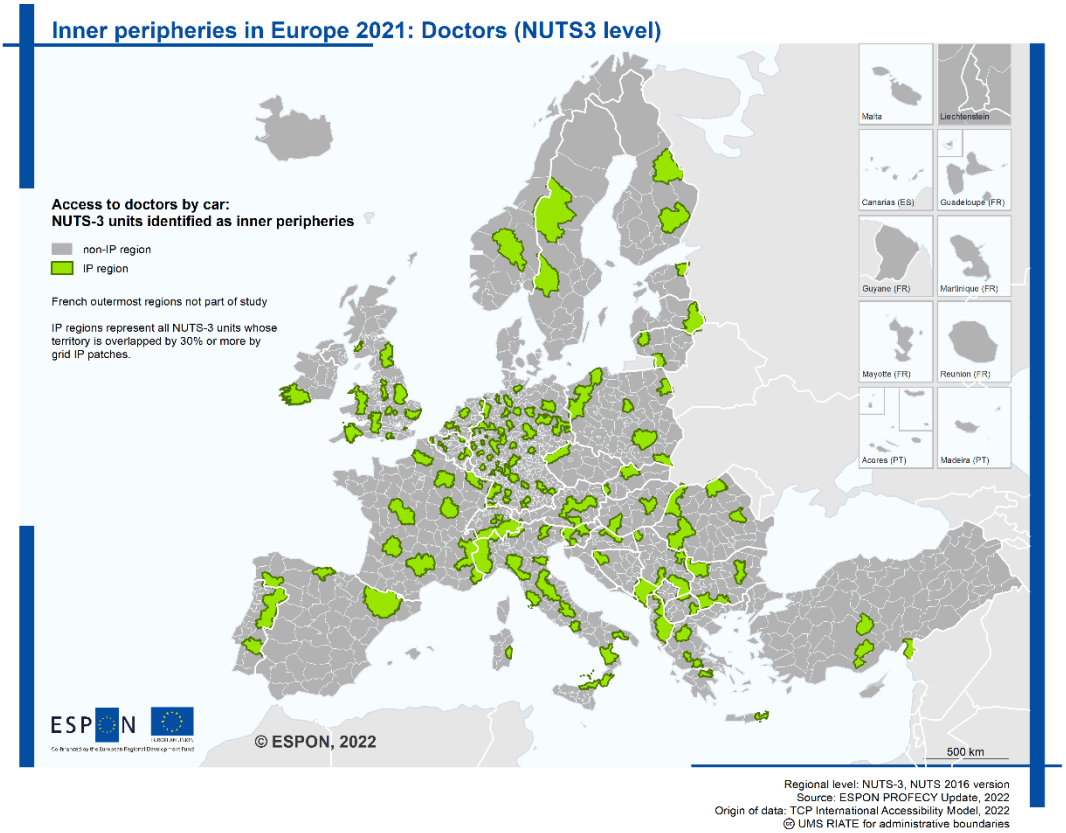


Figure 2-37. Access to doctors 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version).

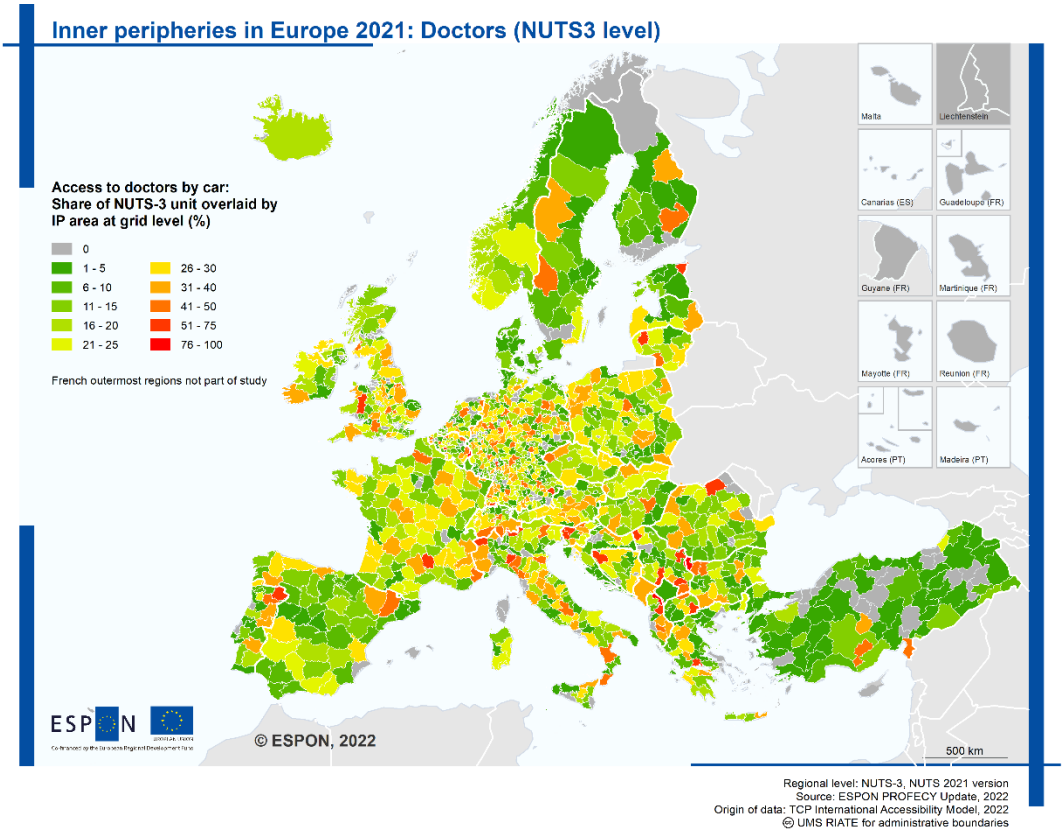


Figure 2-38. Access to doctors 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version).

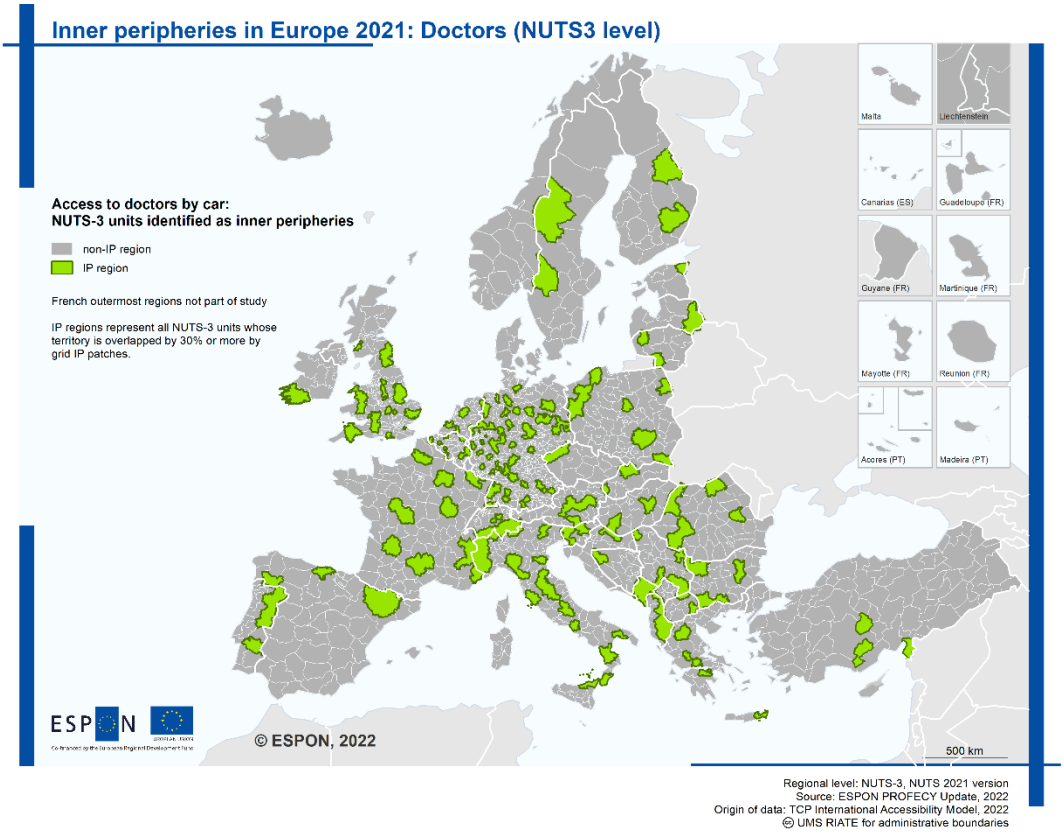


Figure 2-39. Availability of doctors within 30 min car travel time.

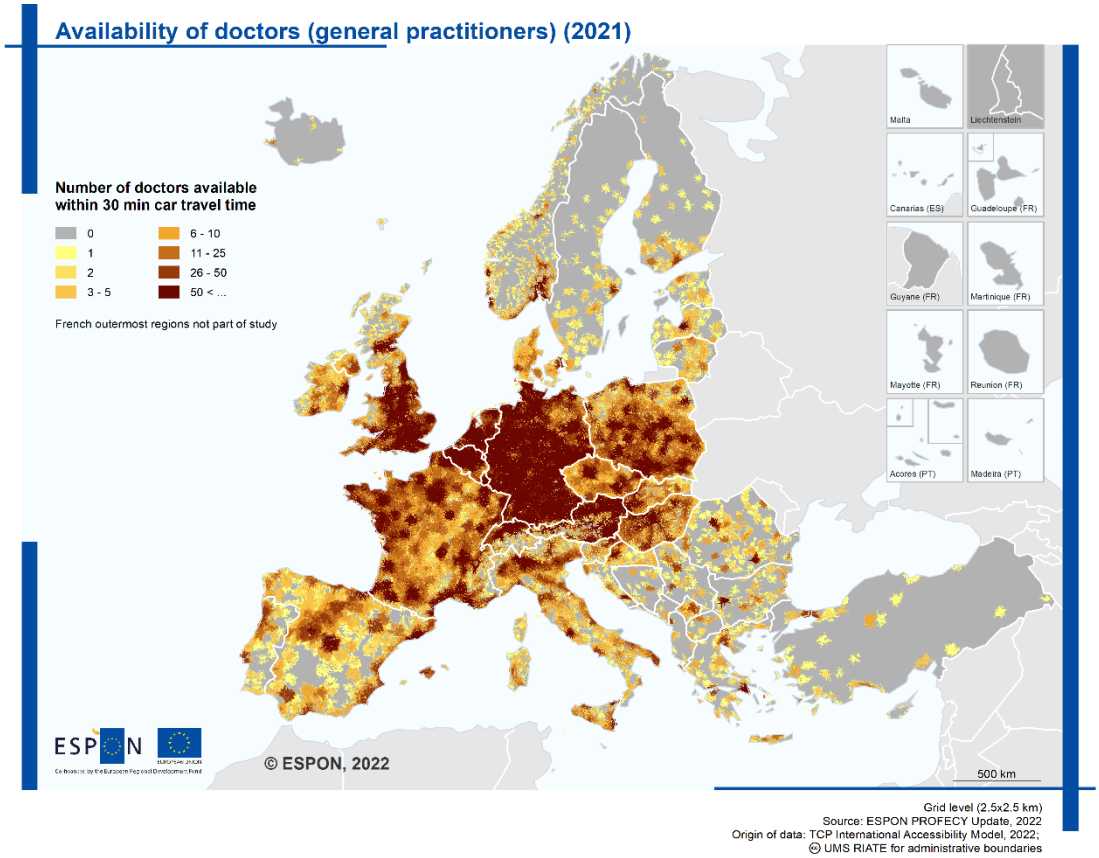


Figure 2-40. Doctors: Areas of risk to become IP in future.

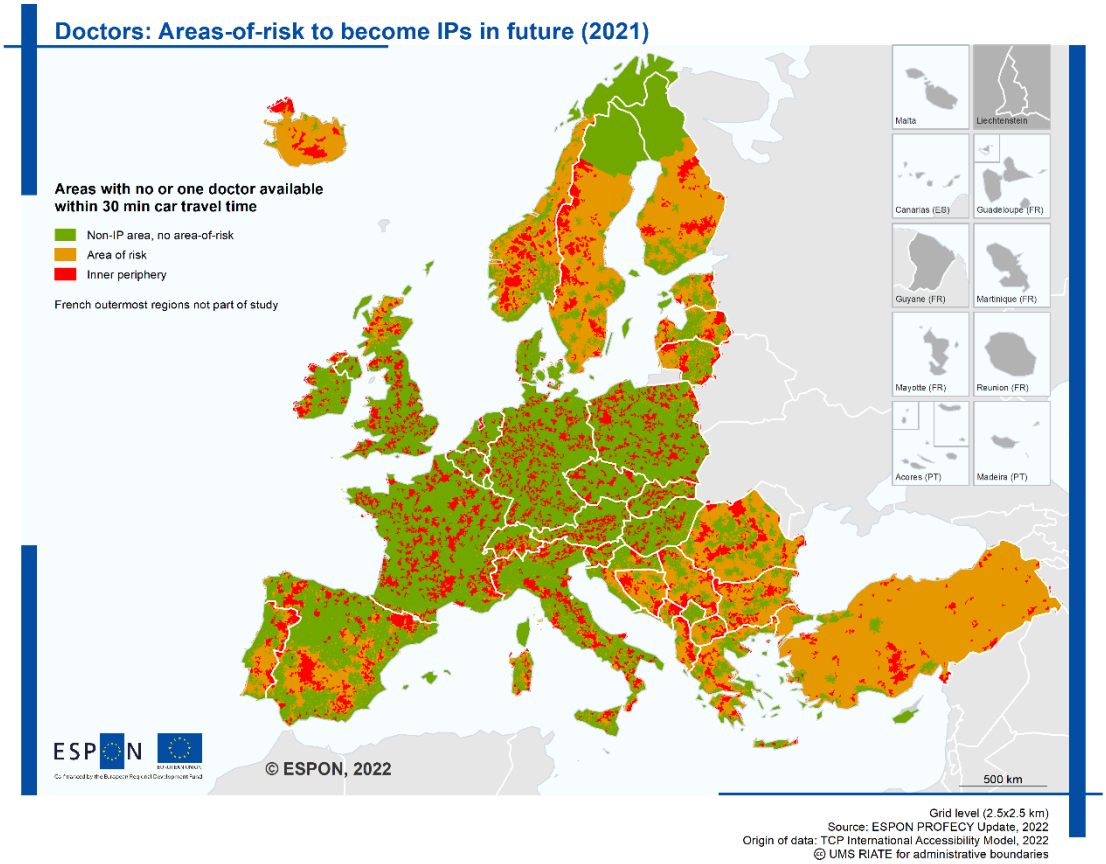


Figure 2-41. Hospitals in Europe.

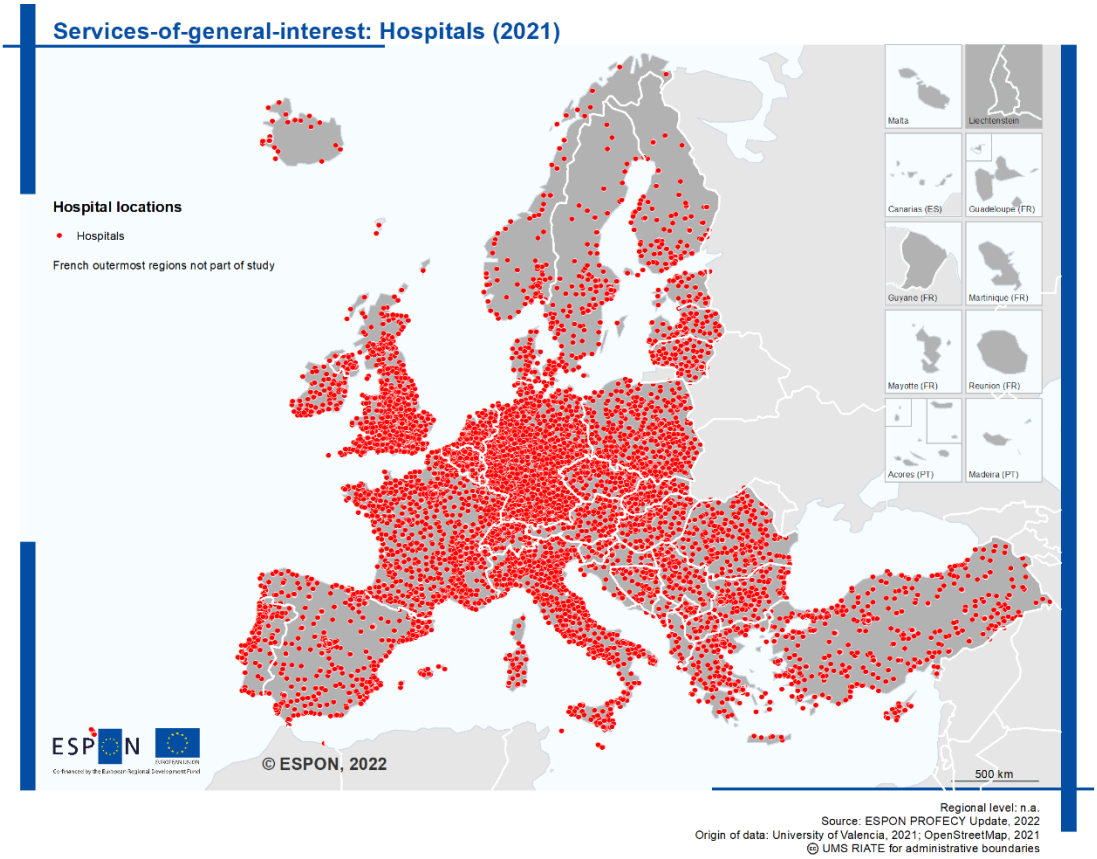


Figure 2-42. Access to hospitals 2021: travel time by car.

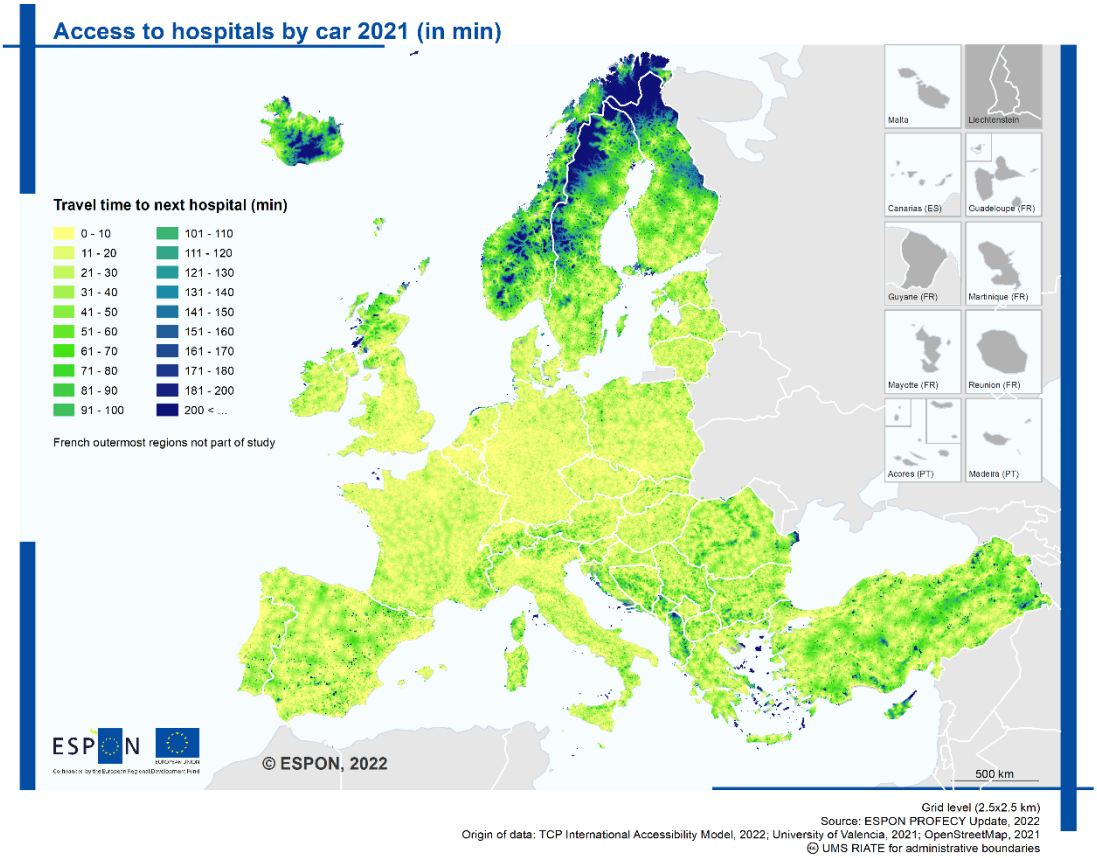
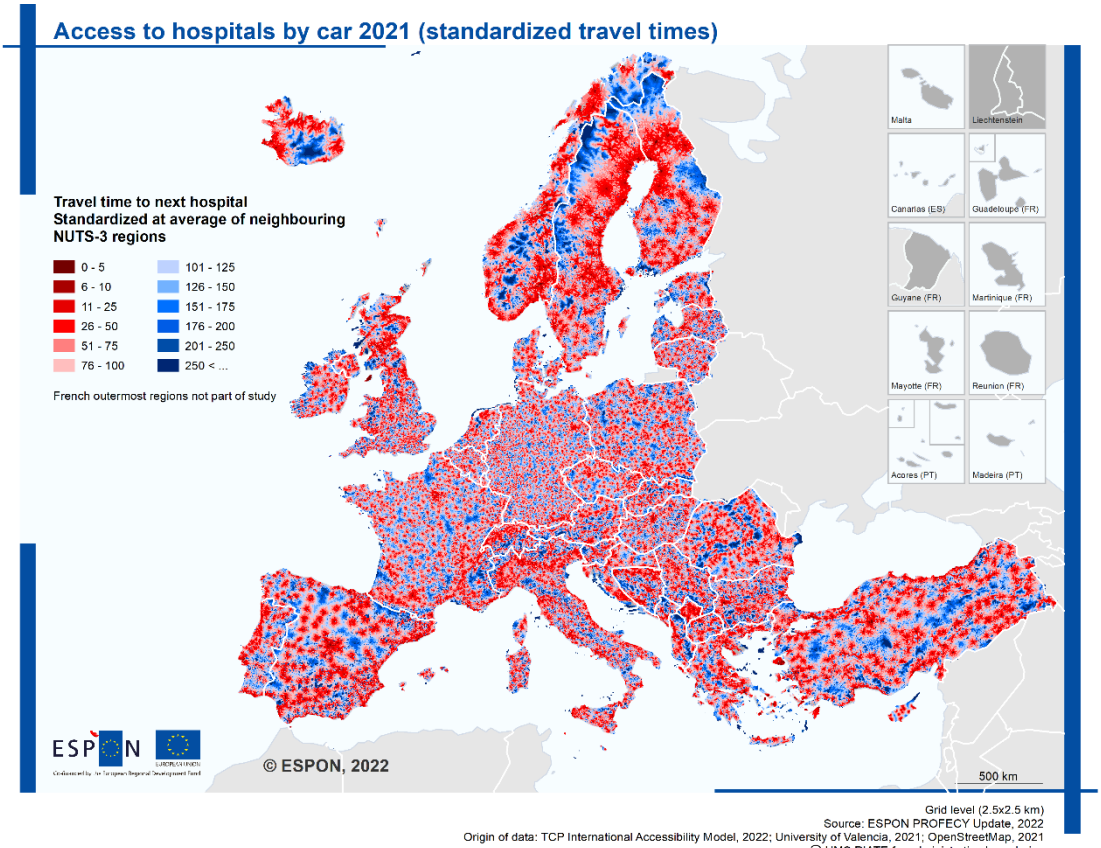
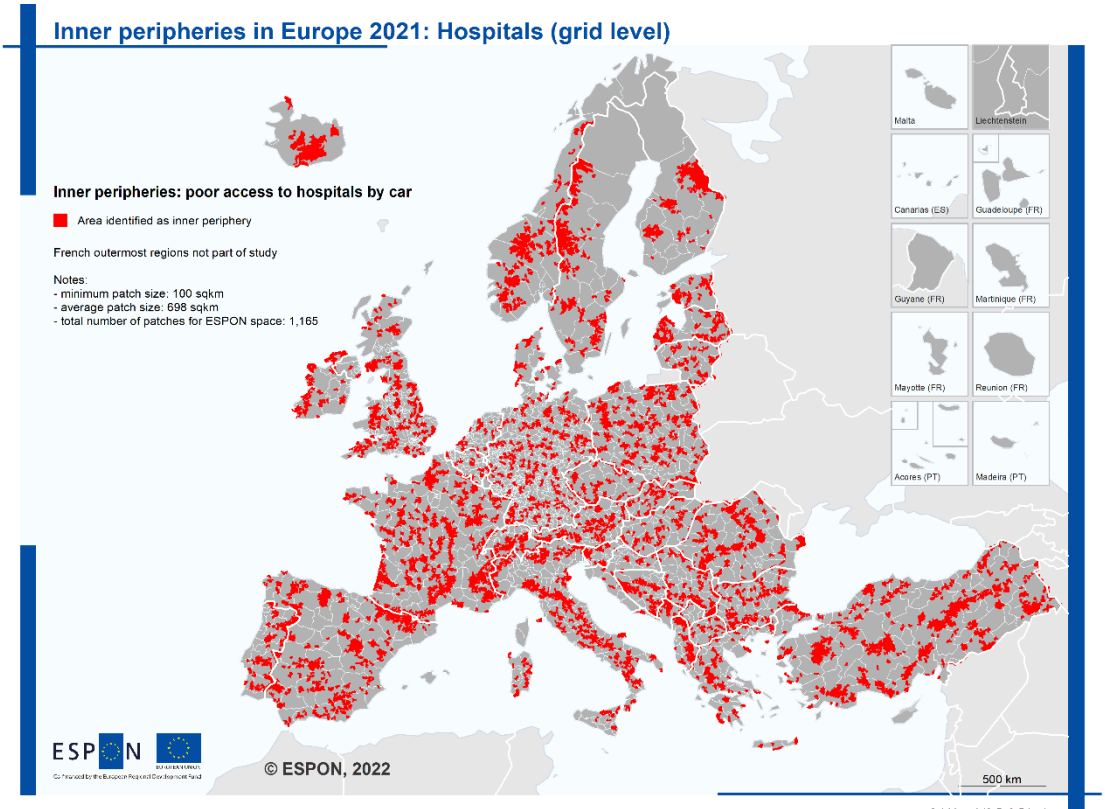


Figure 2-43. Access to hospitals 2021: standardised travel time by car.



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
(c) UMS RIATE for administrative boundaries

Figure 2-44. Access to hospitals 2021: Inner peripheries (grid level).



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
(c) UMS RIATE for administrative boundaries

Figure 2-45. Access to hospitals 2021: Overlay of LAU units with IP areas at grid level.

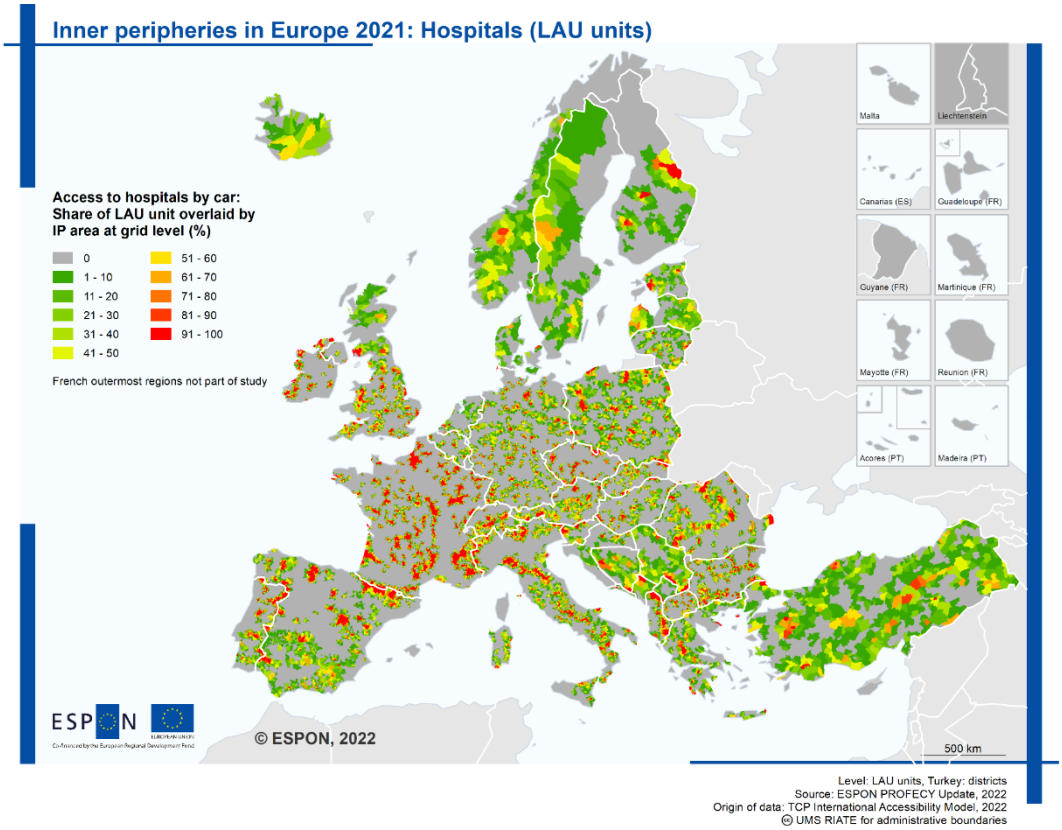


Figure 2-46. Access to hospitals 2021: Identification of LAU units as inner peripheries.

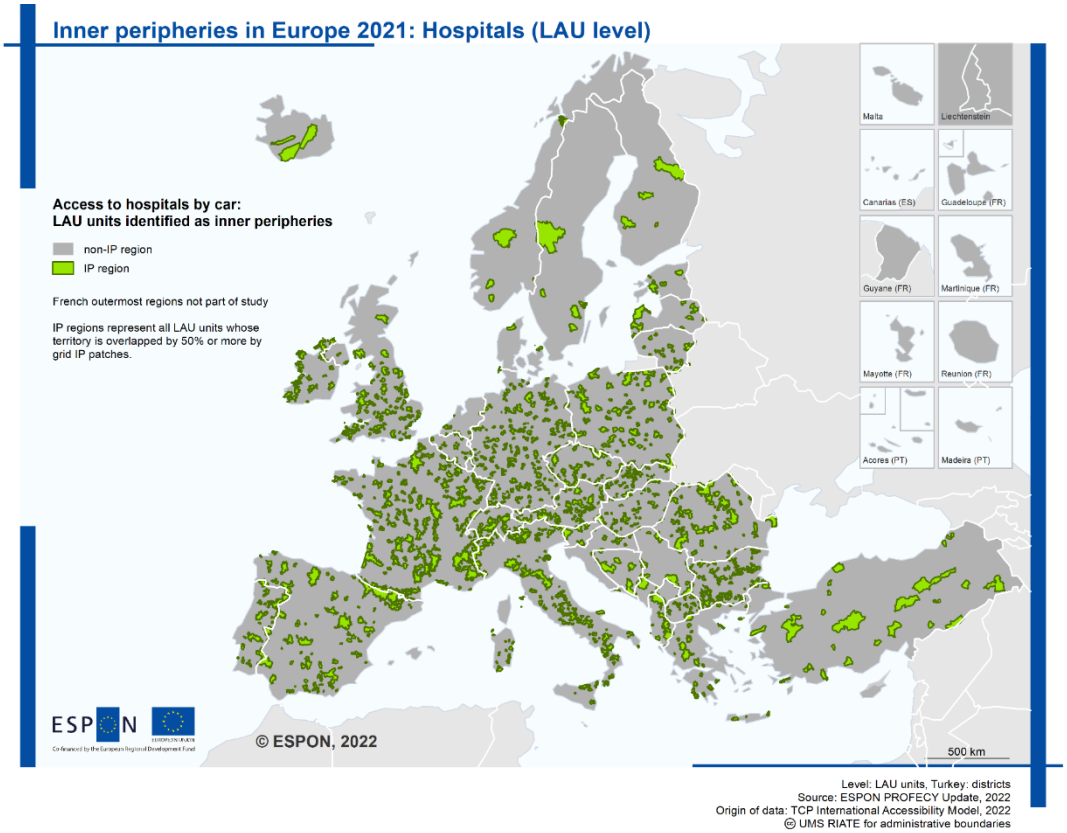


Figure 2-47. Access to hospitals 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version).

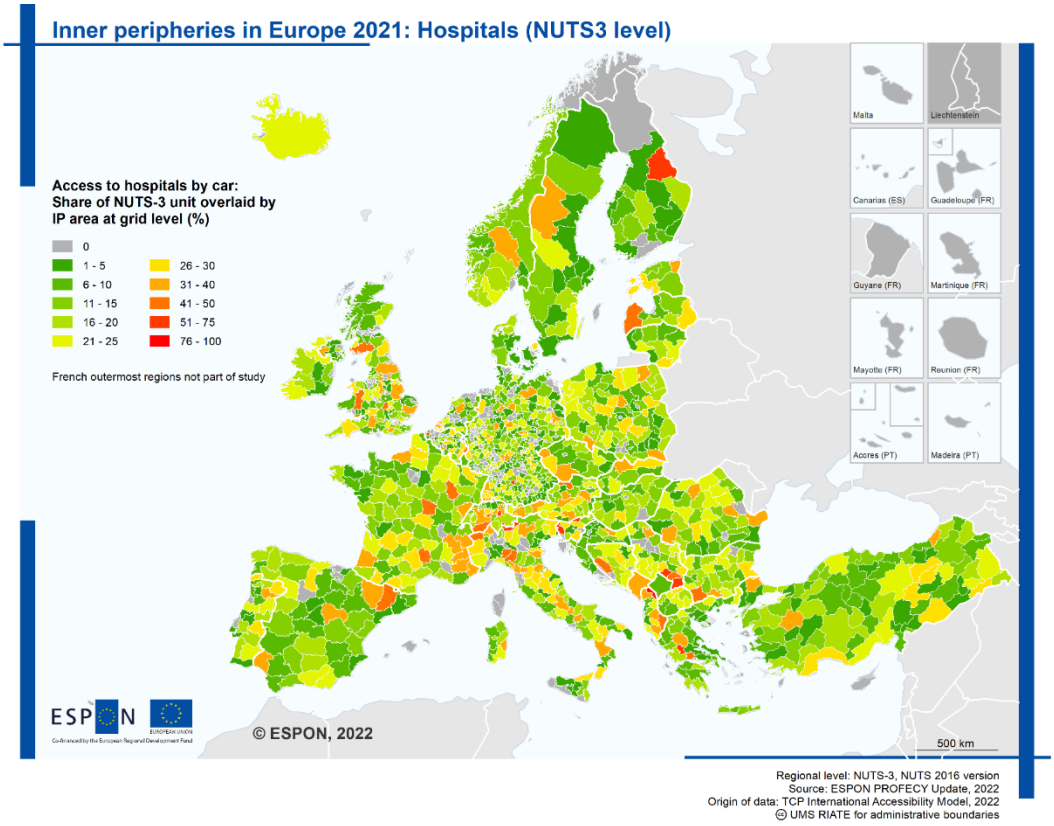


Figure 2-48. Access to hospitals 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version).

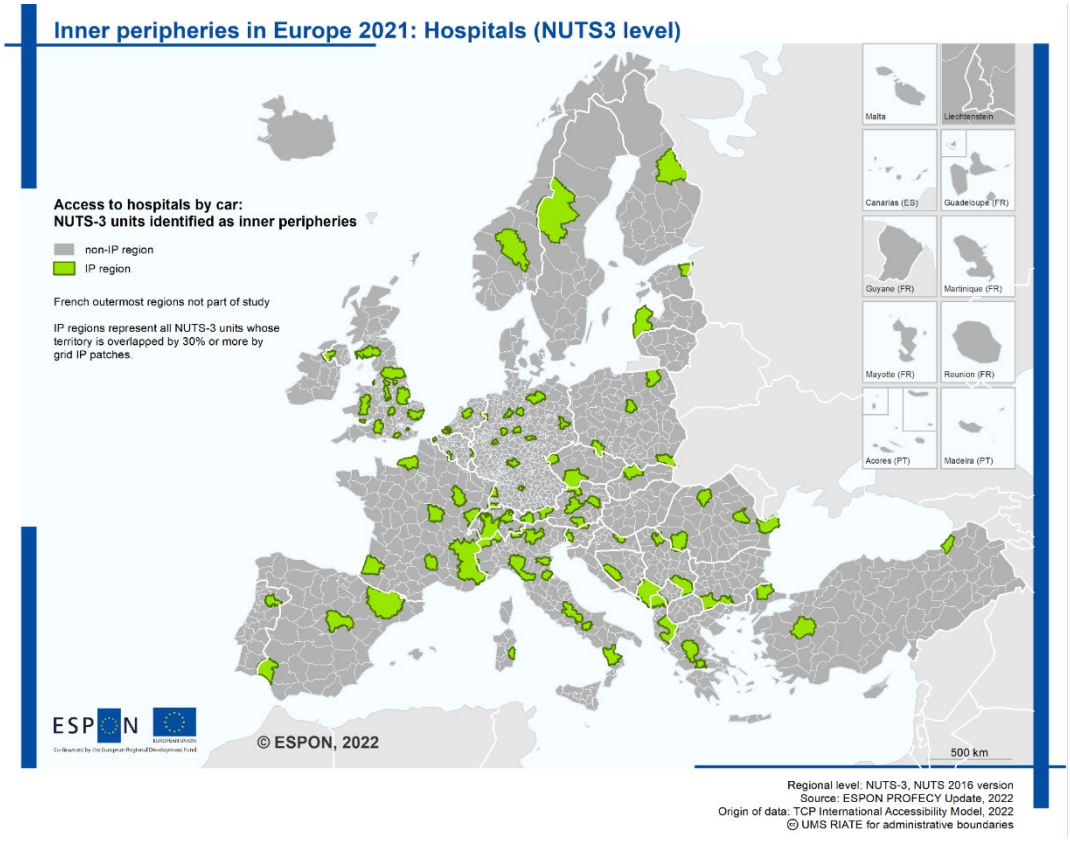


Figure 2-49. Access to hospitals 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version).

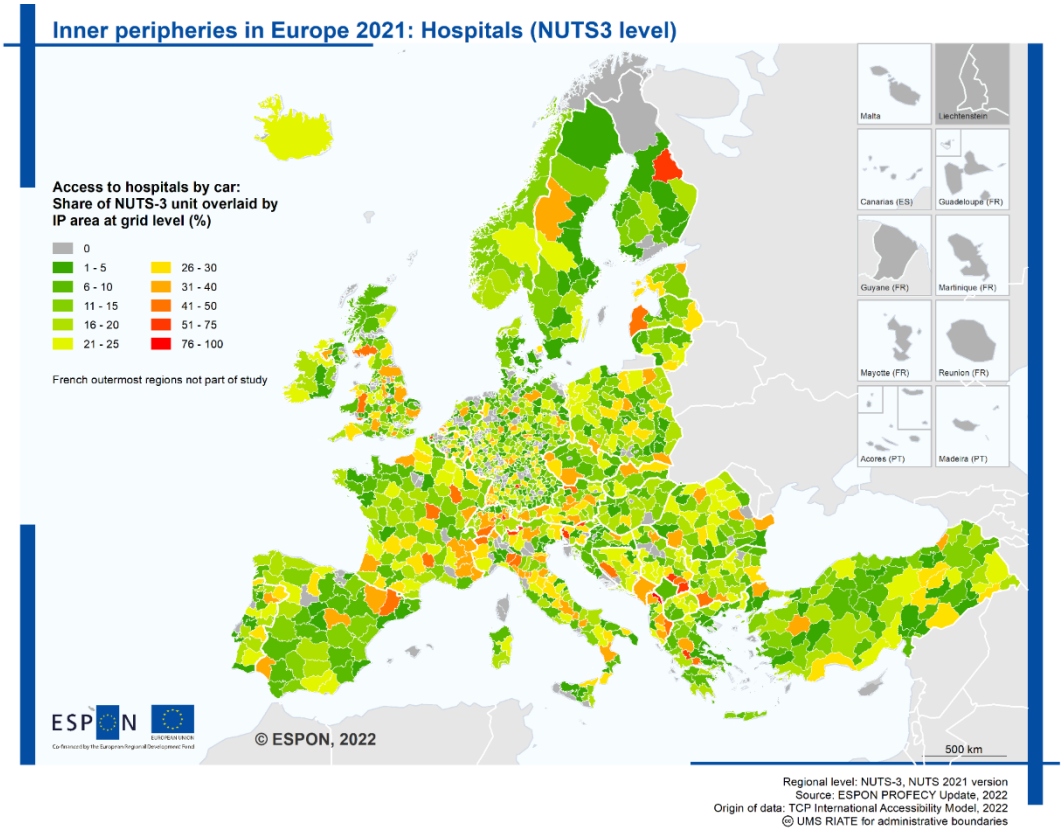


Figure 2-50. Access to hospitals 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version).

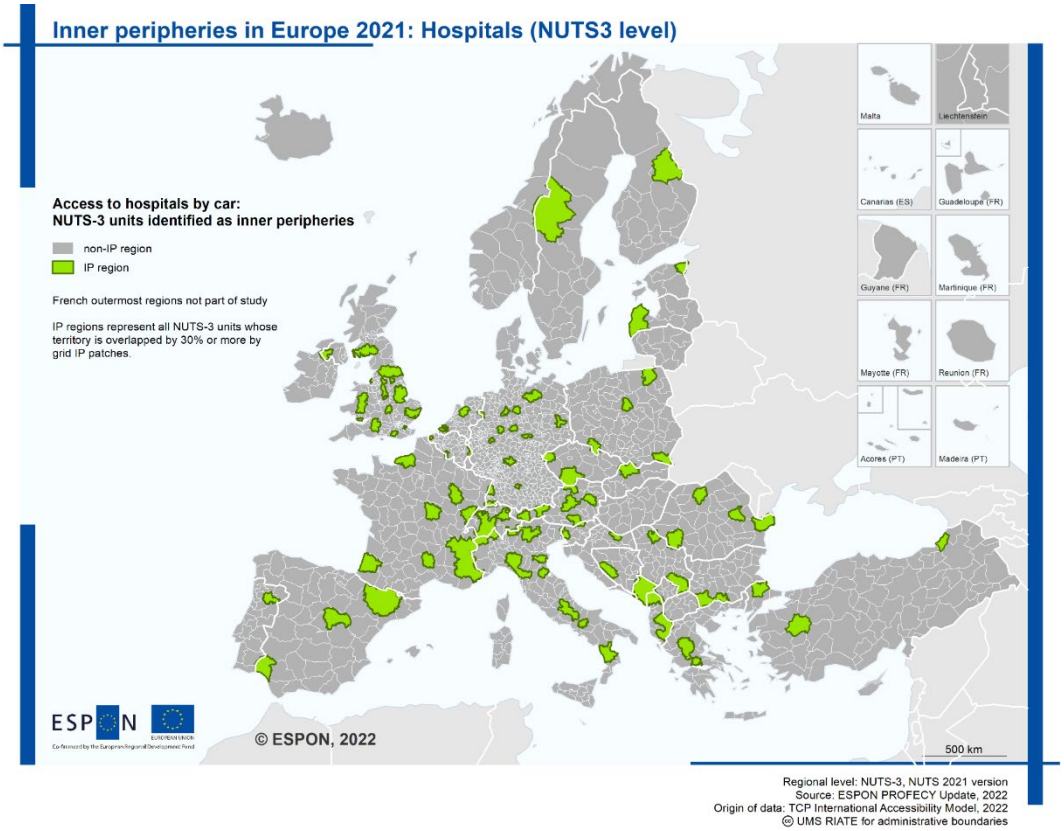


Figure 2-51. Availability of hospitals within 60 minutes car travel time.

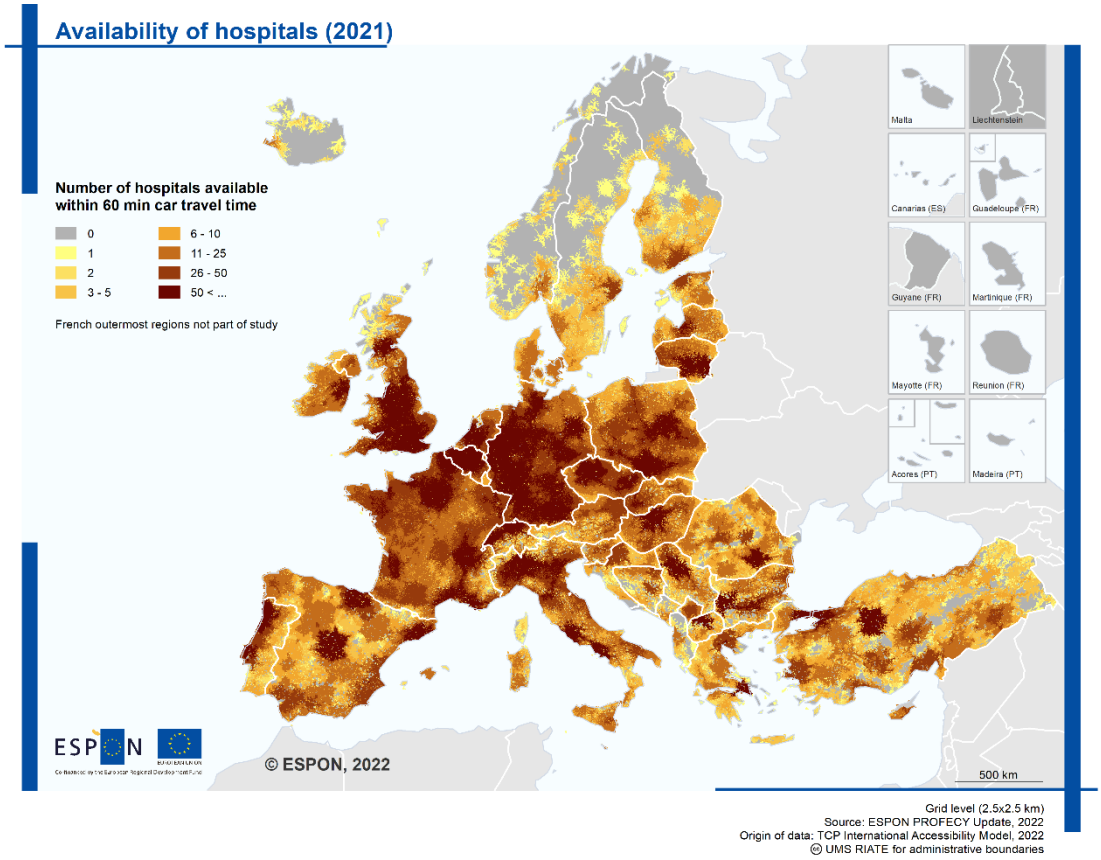


Figure 2-52. Hospitals: Areas of risk to become IP in future.

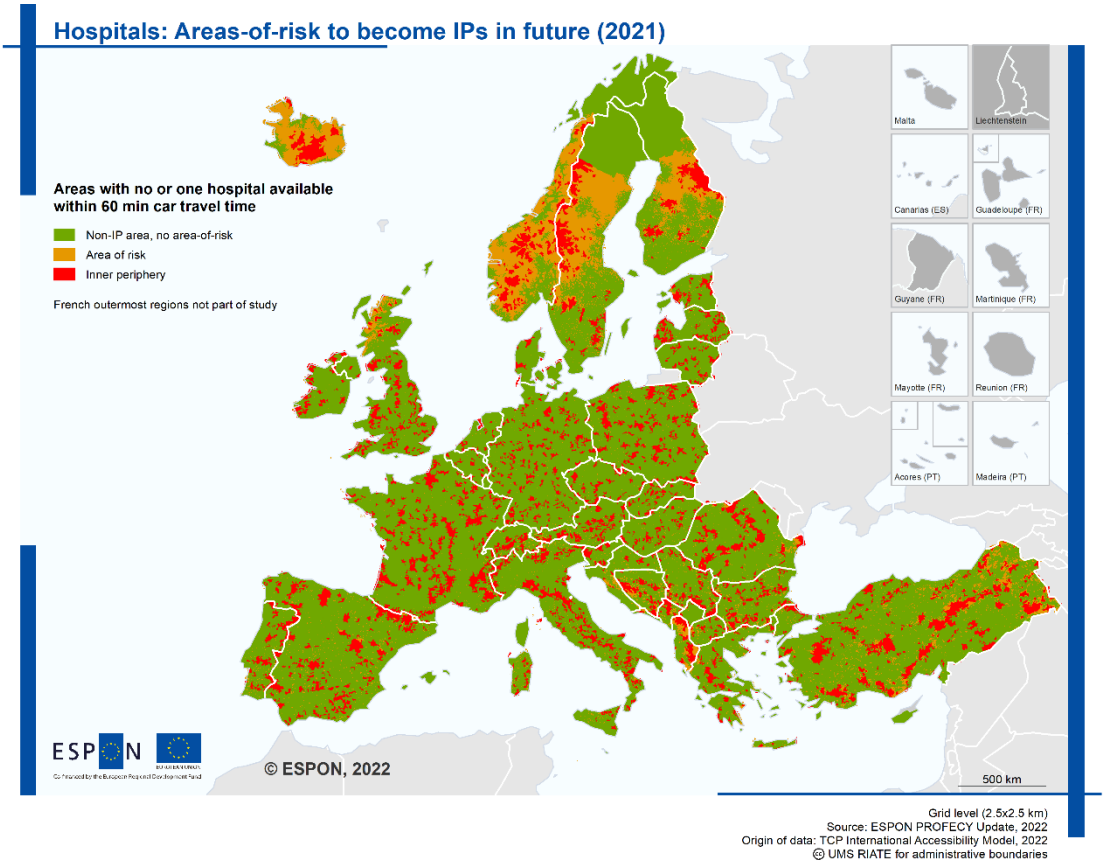


Figure 2-53. Pharmacies in Europe.

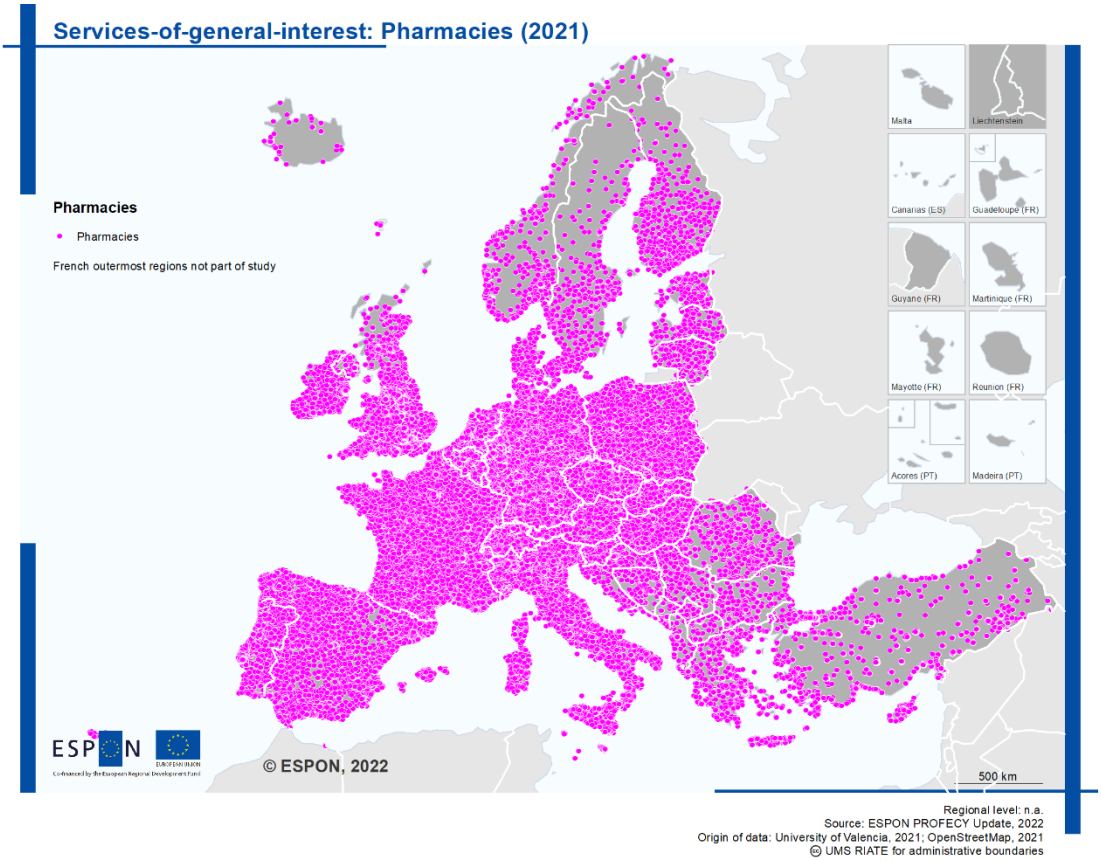


Figure 2-54. Density of Pharmacies in Europe (2021) (2016 NUTS version).

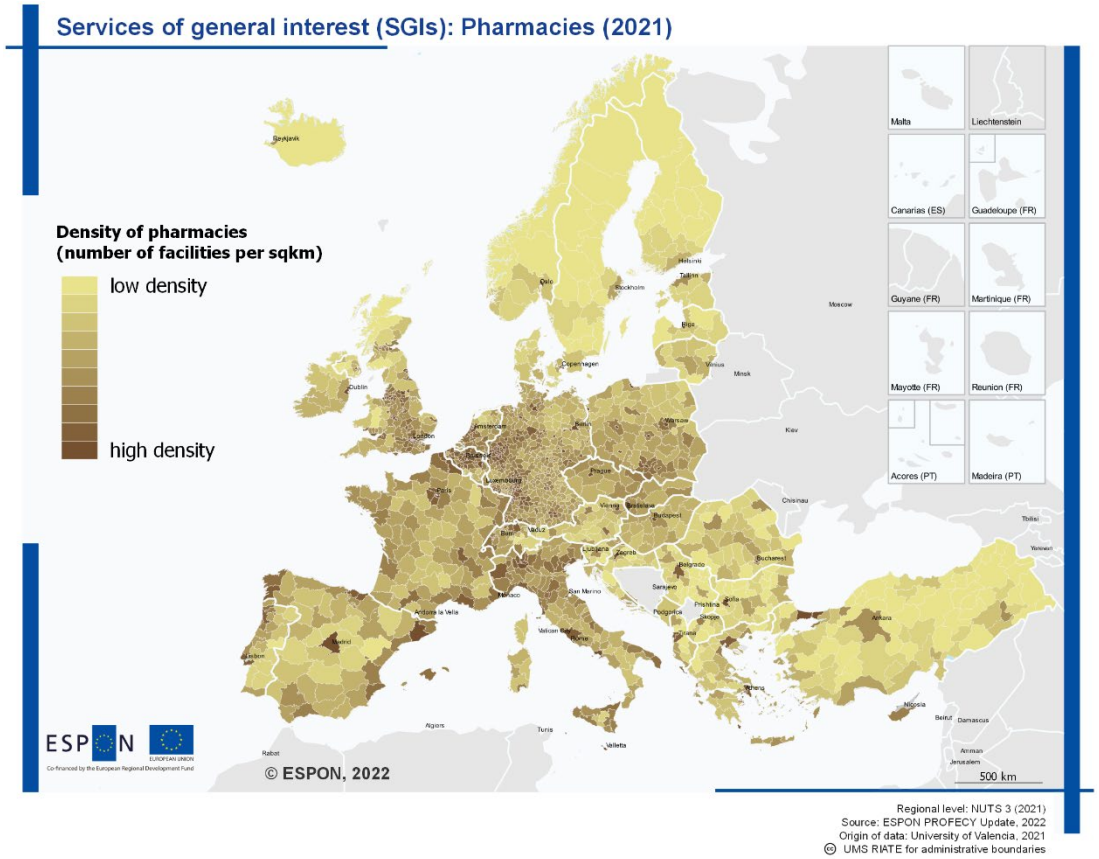


Figure 2-55. Density of Pharmacies in Europe (2021) (2021 NUTS version).

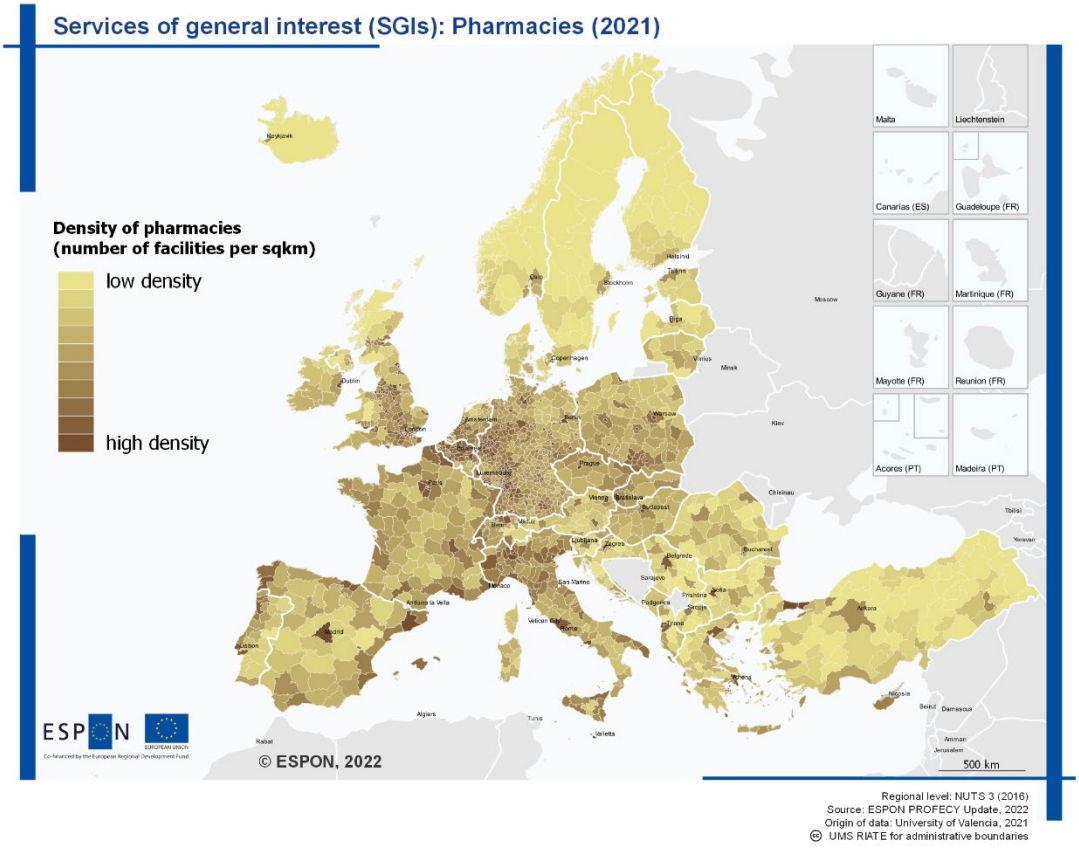


Figure 2-56. Access to pharmacies 2021: travel time by car.

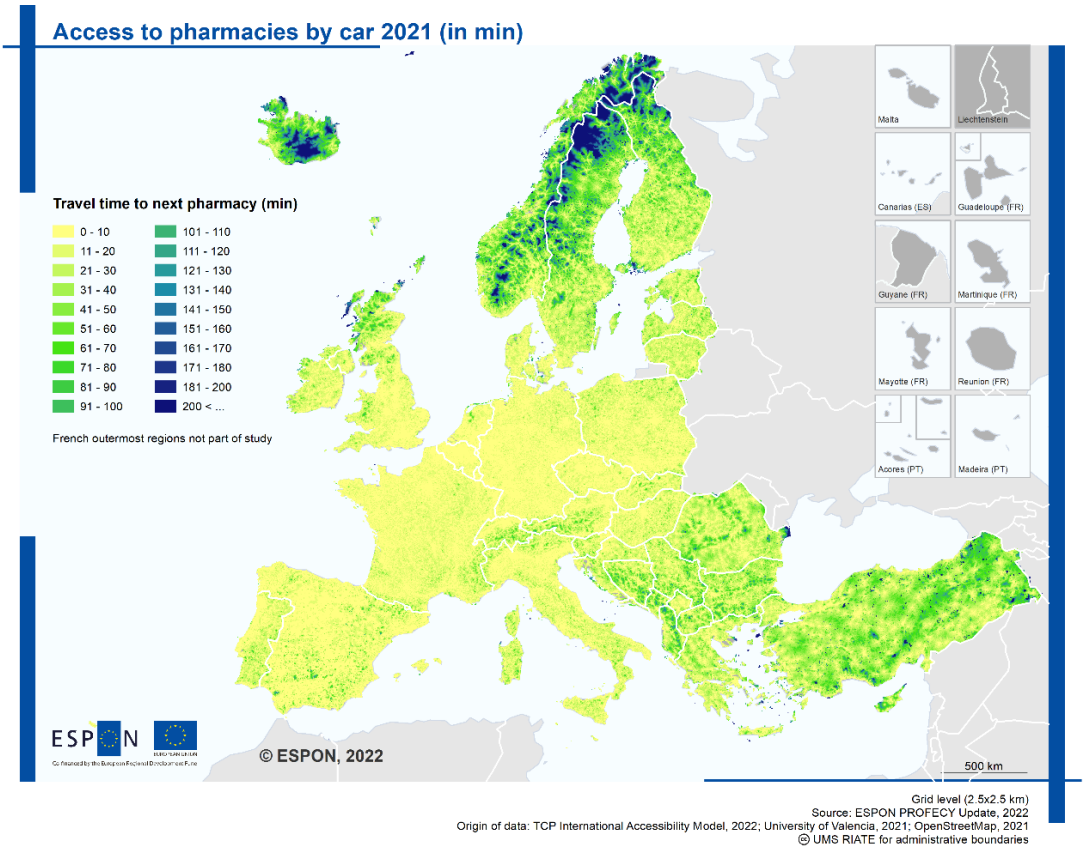
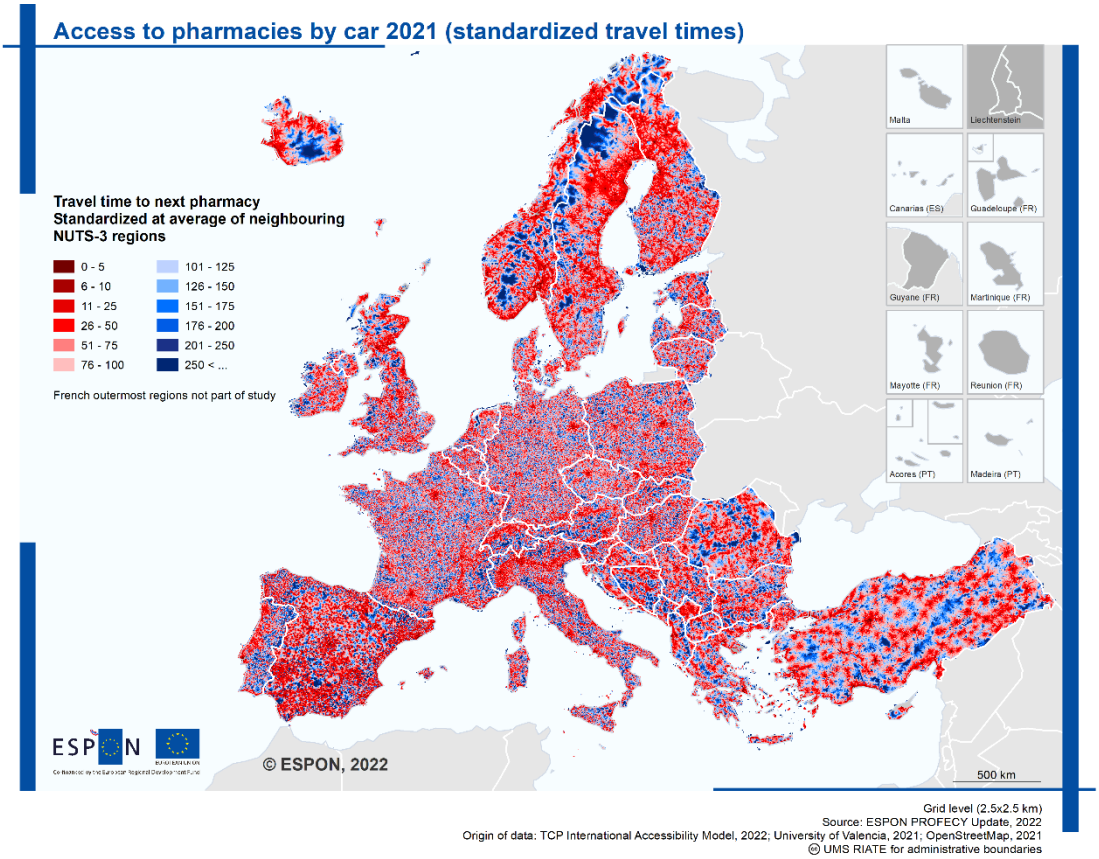
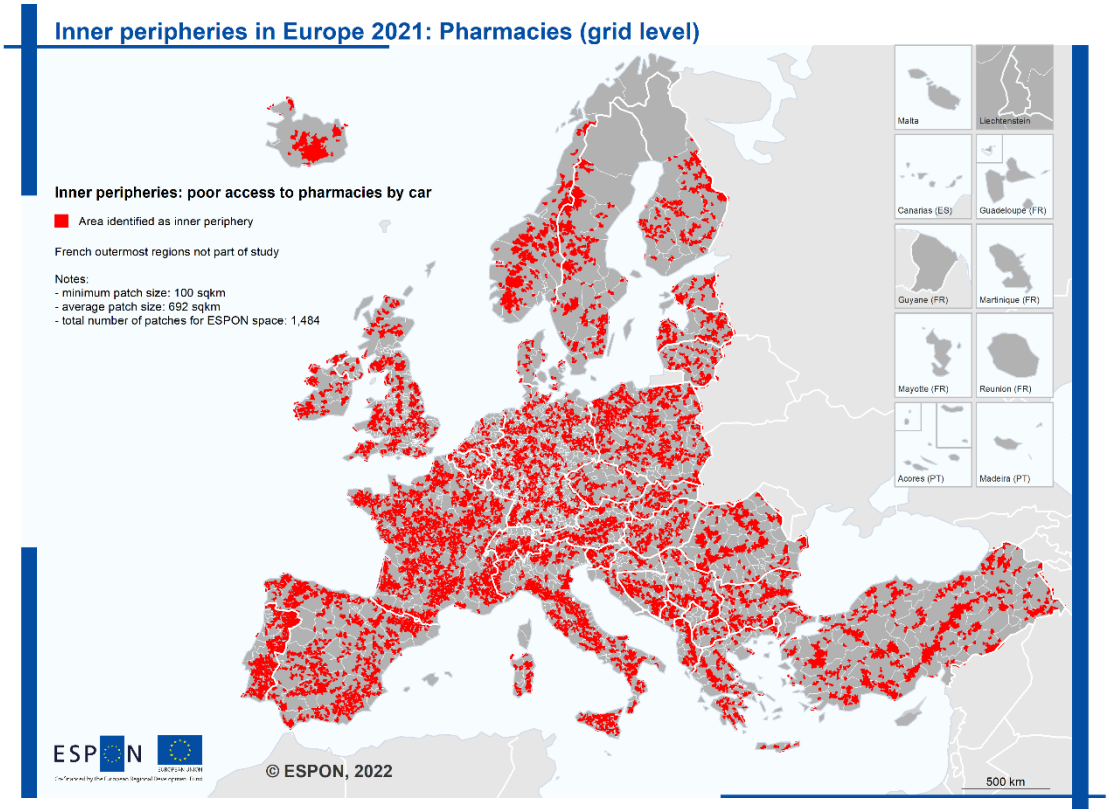


Figure 2-57. Access to pharmacies 2021: standardized travel time by car.



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
© UMS RIATE for administrative boundaries

Figure 2-58. Access to pharmacies 2021: Inner peripheries (grid level).



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
© UMS RIATE for administrative boundaries

Figure 2-59. Access to pharmacies 2021: Overlay of LAU units with IP areas at grid level.

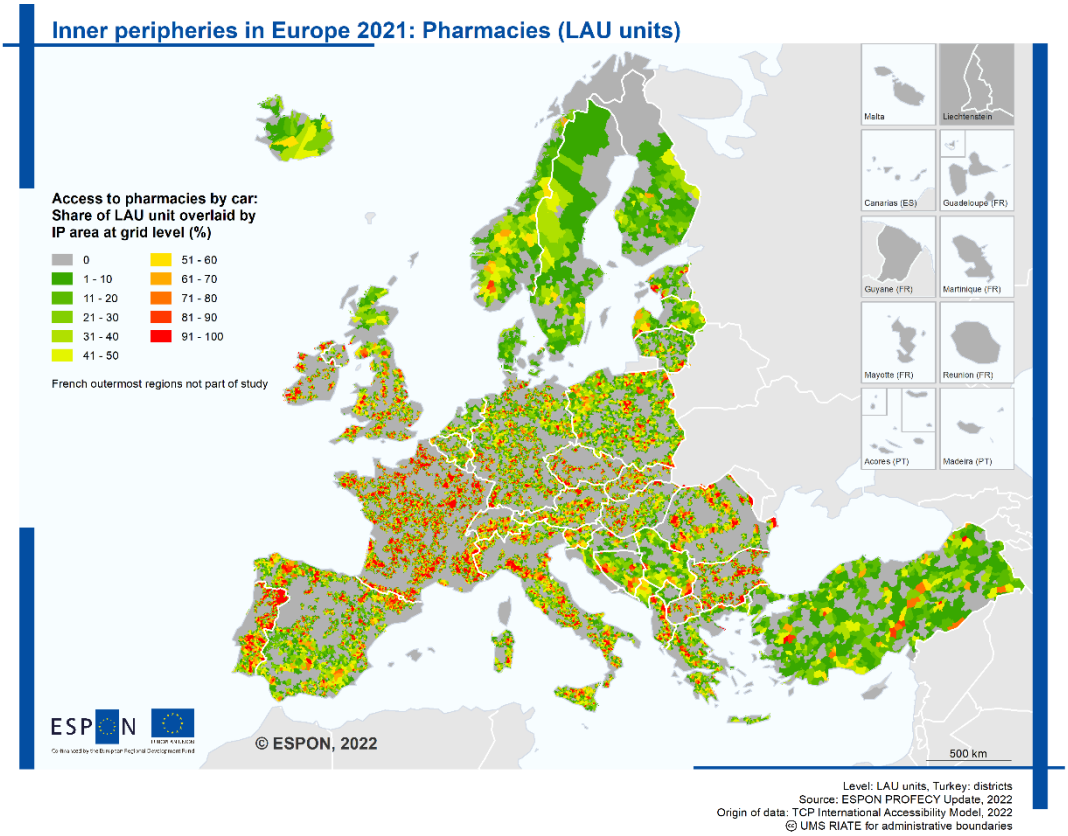


Figure 2-60. Access to pharmacies 2021: Identification of LAU units as inner peripheries.

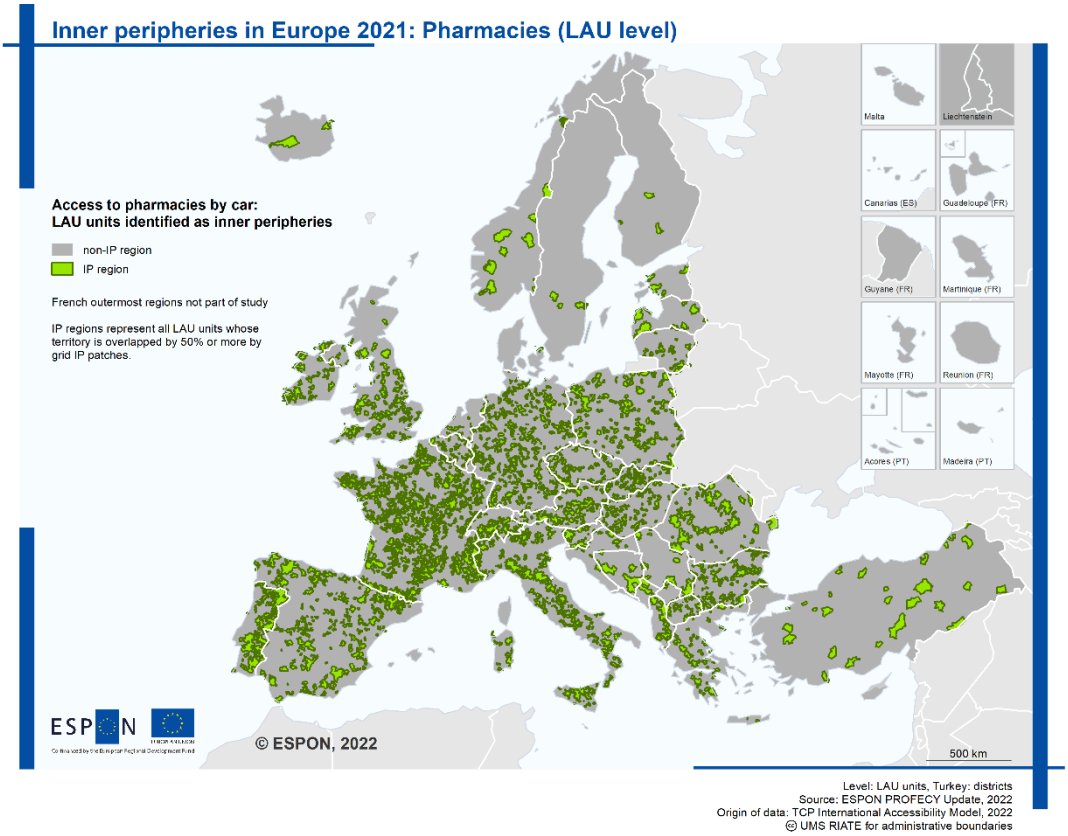


Figure 2-61. Access to pharmacies 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version).

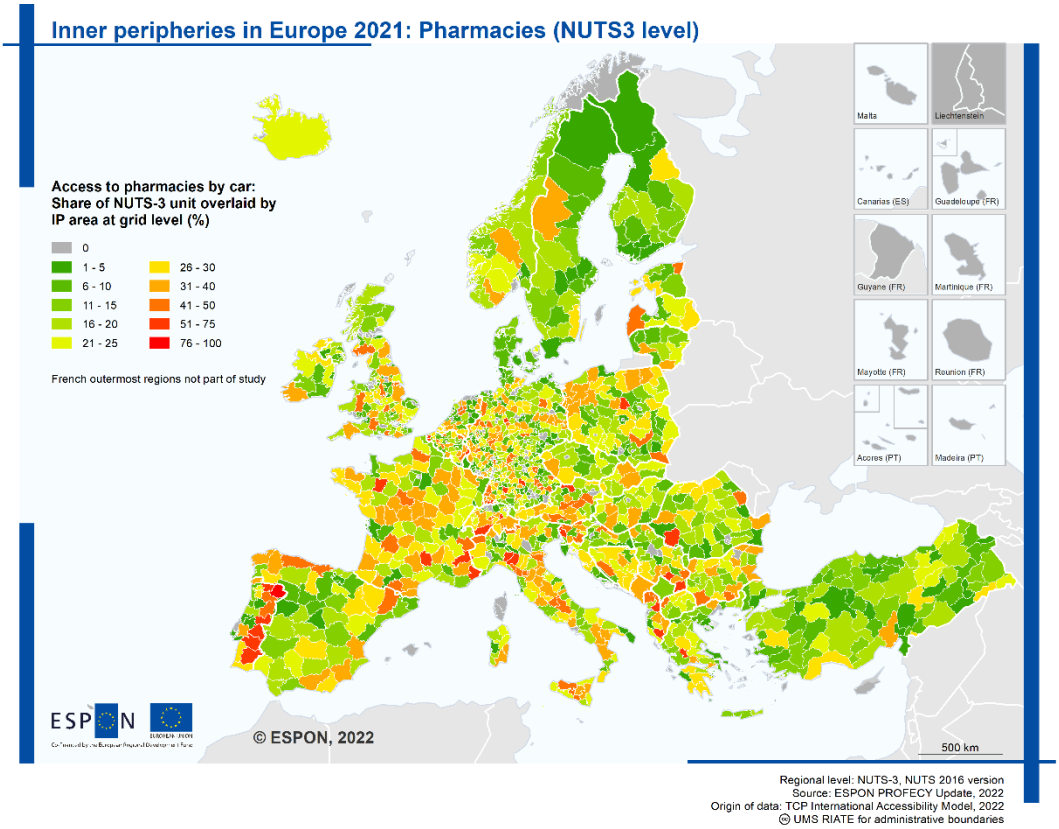


Figure 2-62. Access to pharmacies 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version).

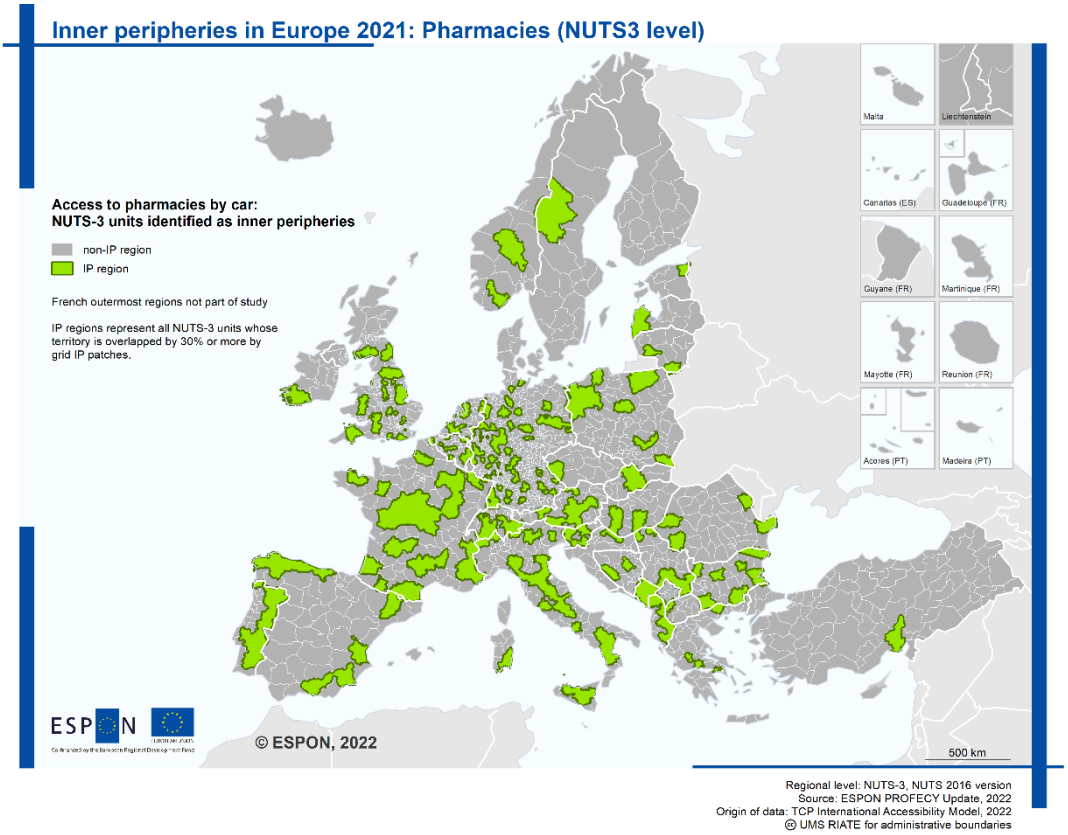


Figure 2-63. Access to pharmacies 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version).

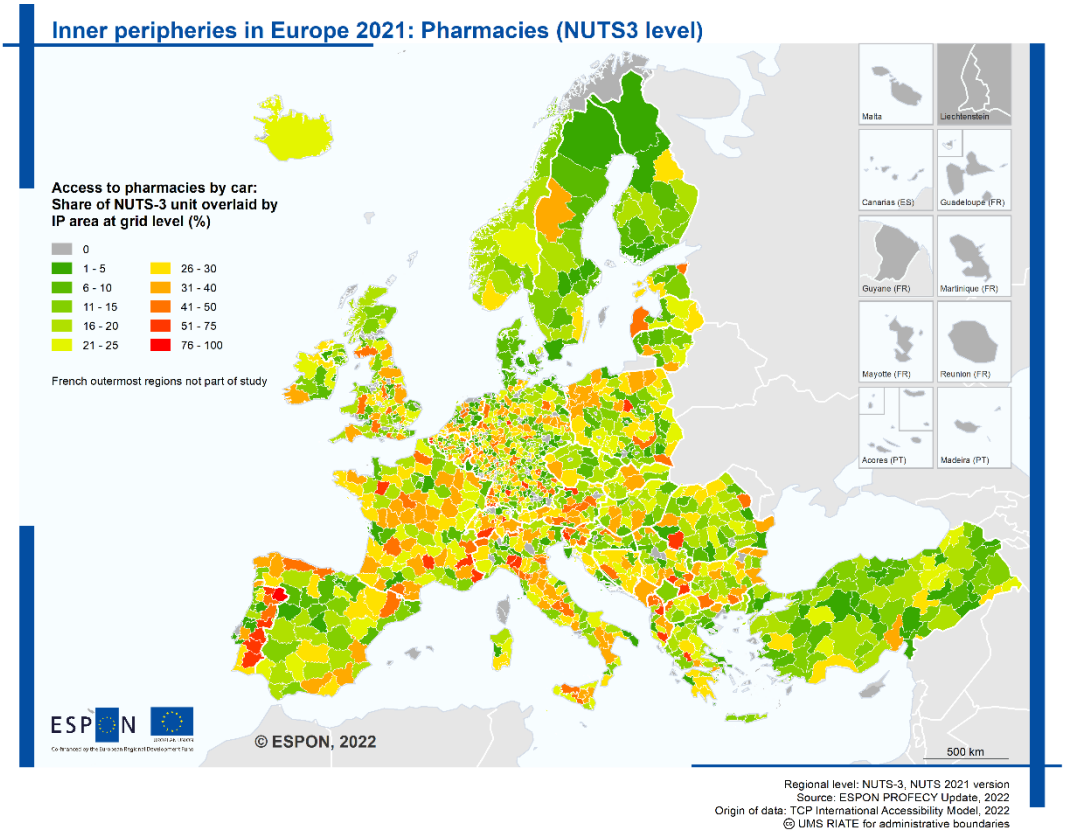


Figure 2-64. Access to pharmacies 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version).

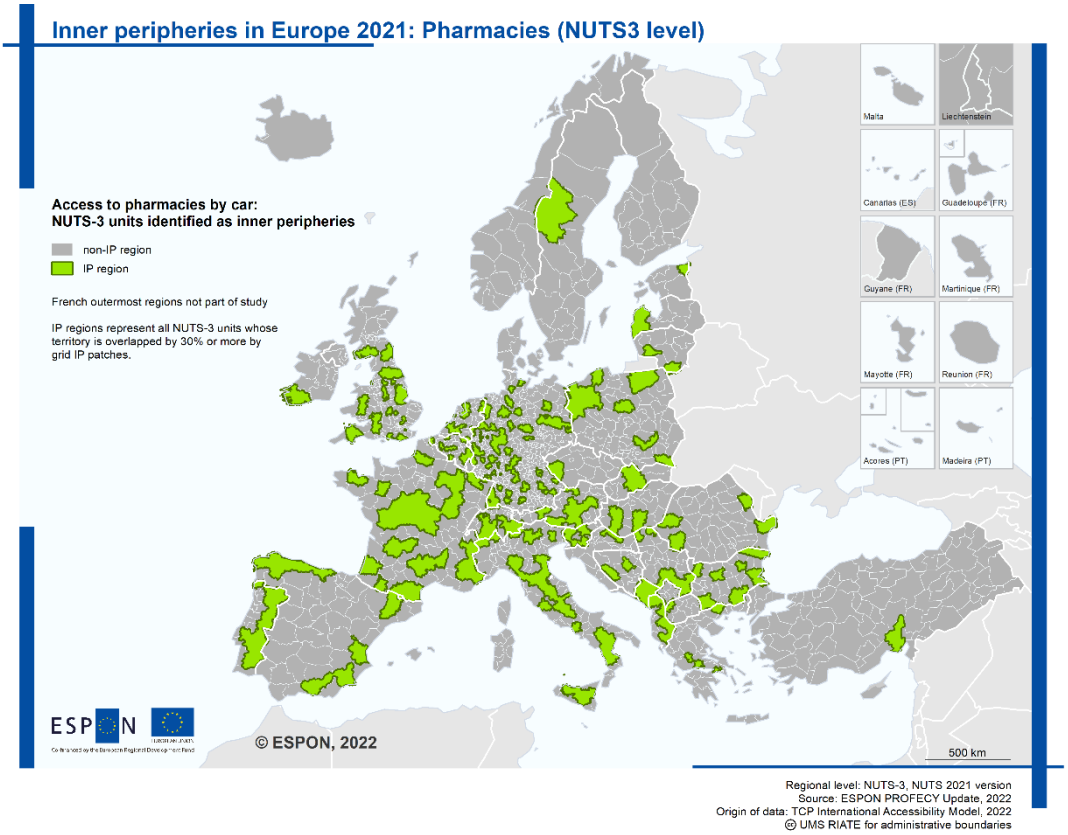


Figure 2-65. Availability of pharmacies within 15 minutes car travel time.

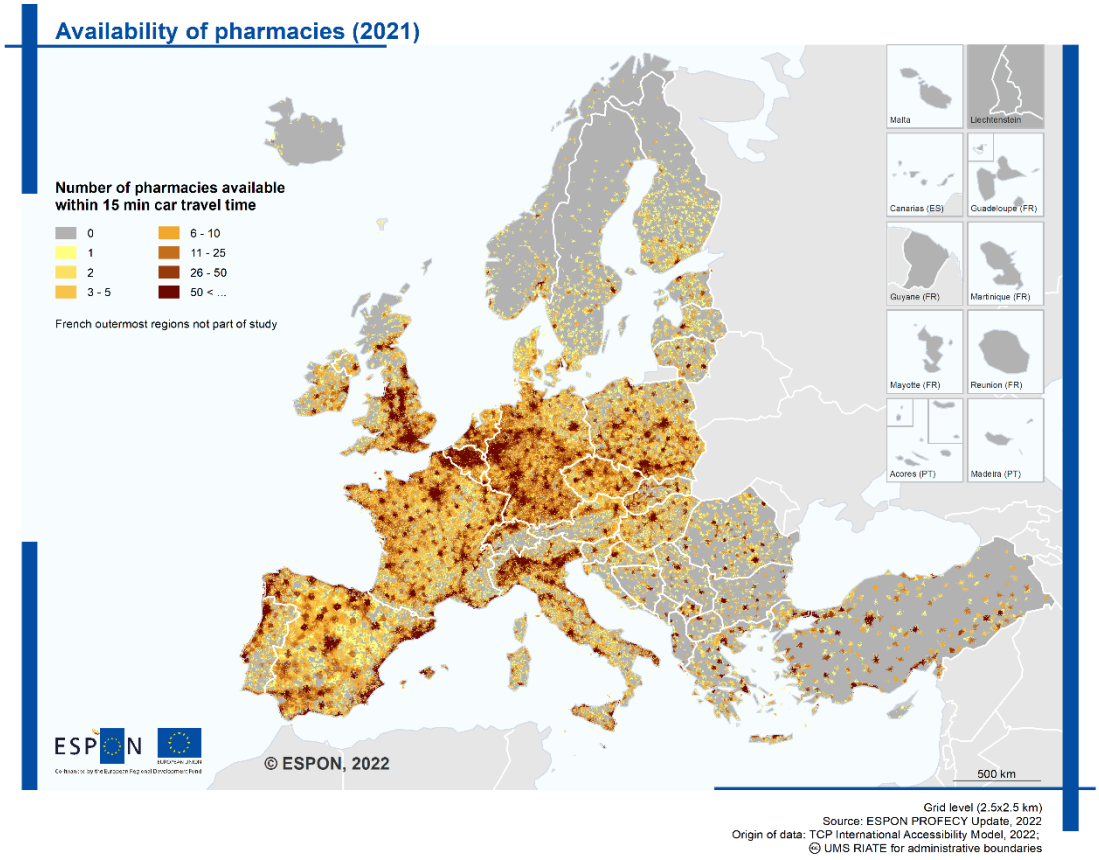
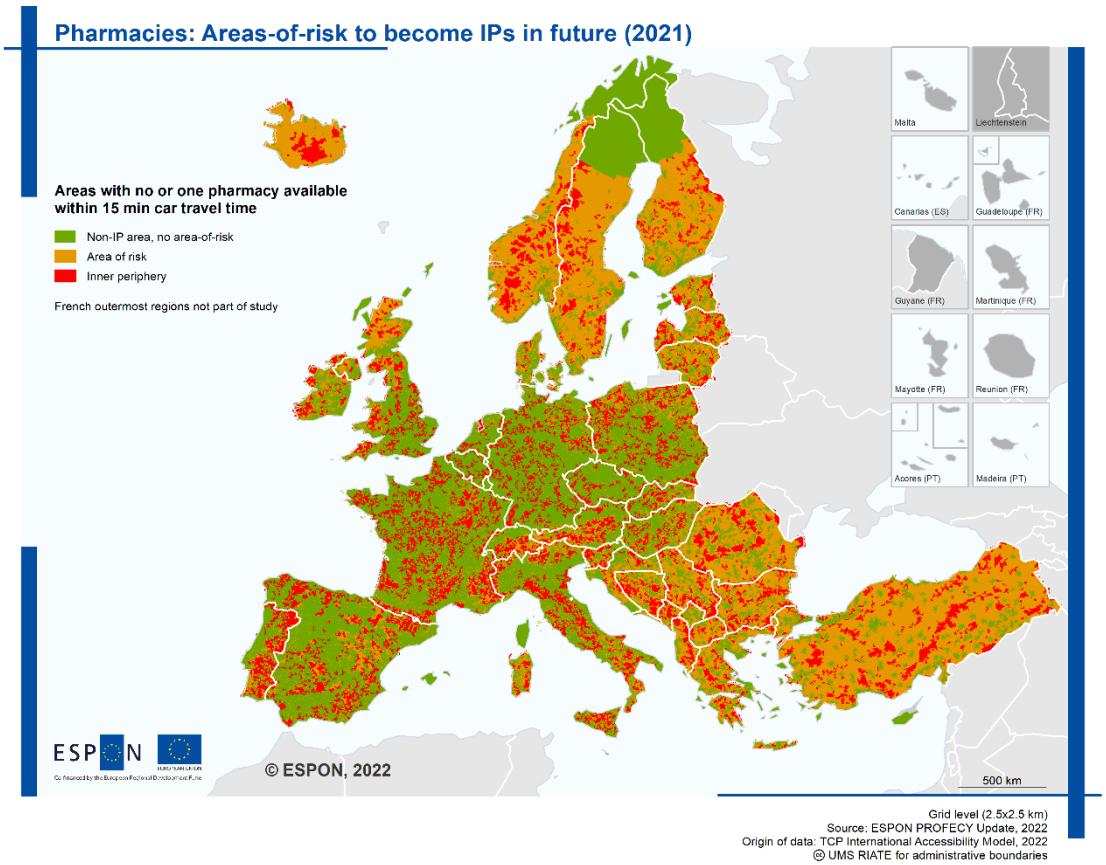


Figure 2-66. Pharmacies: Areas of risk to become IP in future.



2.4 Education

Primary and secondary schools have been treated as individual services. The following maps have been generated as part of the delineation process:

- Schools in Europe
- Density of primary schools in Europe (2021) (2016 NUTS version)
- Density of primary schools in Europe (2021) (2021 NUTS version)
- Density of secondary schools in Europe (2021) (2016 NUTS version)
- Density of secondary schools in Europe (2021) (2021 NUTS version)
- Access to primary schools 2021: Travel time by car
- Access to primary schools 2021: Standardized travel time by car
- Access to primary schools 2021: Delineation of inner peripheries at grid level
- Access to primary schools 2021: Overlay of LAU units with IP areas at grid level
- Access to primary schools 2021: Identification of LAU units as inner peripheries
- Access to primary schools 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 version)
- Access to primary schools 2021: Identification of NUTS-3 regions as inner peripheries (2016 version)
- Access to primary schools 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 version)
- Access to primary schools 2021: Identification of NUTS-3 regions as inner peripheries (2021 version)
- Availability of primary schools within 15 minutes car travel time
- Primary schools: Areas of risk to become IP in future
- Access to secondary schools 2021: Travel time by car
- Access to secondary schools 2021: Standardized travel time by car
- Access to secondary schools 2021: Delineation of inner peripheries at grid level
- Access to secondary schools 2021: Overlay of LAU units with IP areas at grid level
- Access to secondary schools 2021: Identification of LAU units as inner peripheries
- Access to secondary schools 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 version)
- Access to secondary schools 2021: Identification of NUTS-3 regions as inner peripheries (2016 version)
- Access to secondary schools 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 version)
- Access to secondary schools 2021: Identification of NUTS-3 regions as inner peripheries (2021 version)
- Availability of secondary schools within 60 minutes car travel time
- Secondary schools: Areas of risk to become IP in future

Figure 2-67. Schools in Europe.

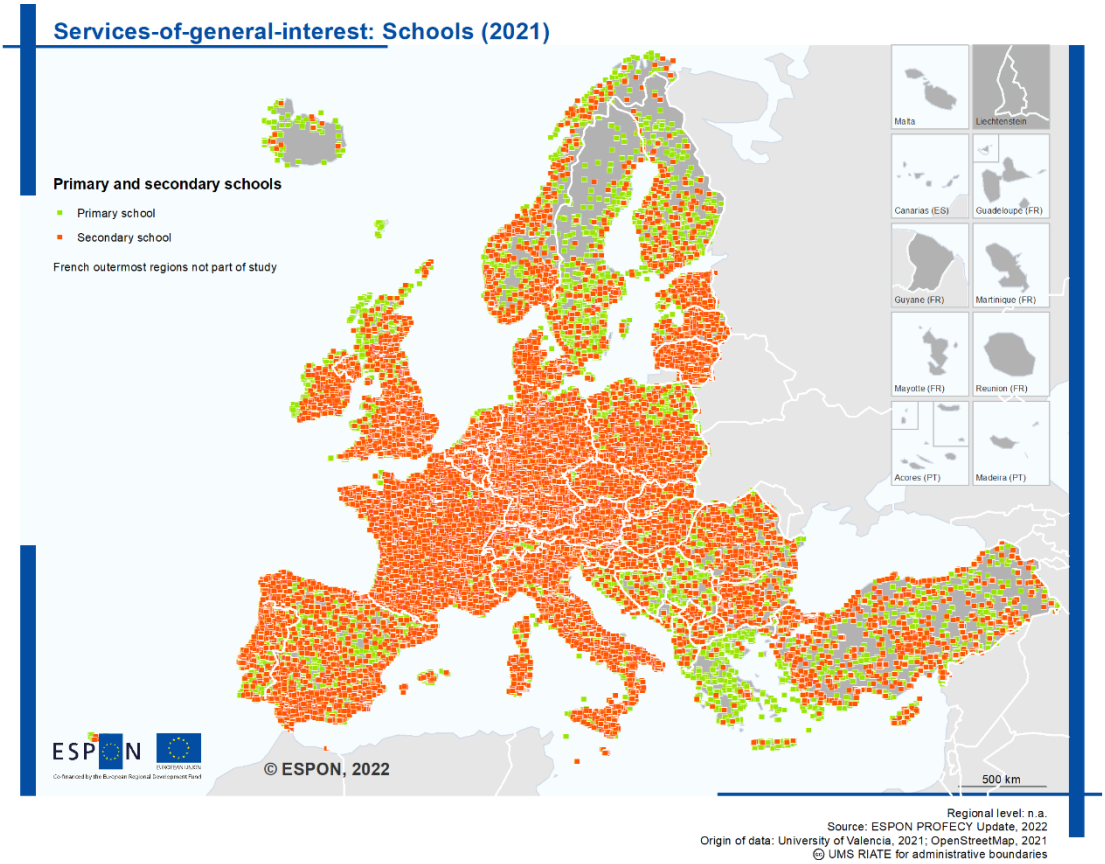


Figure 2-68. Density of Primary Schools in Europe (2021) (2016 NUTS version).

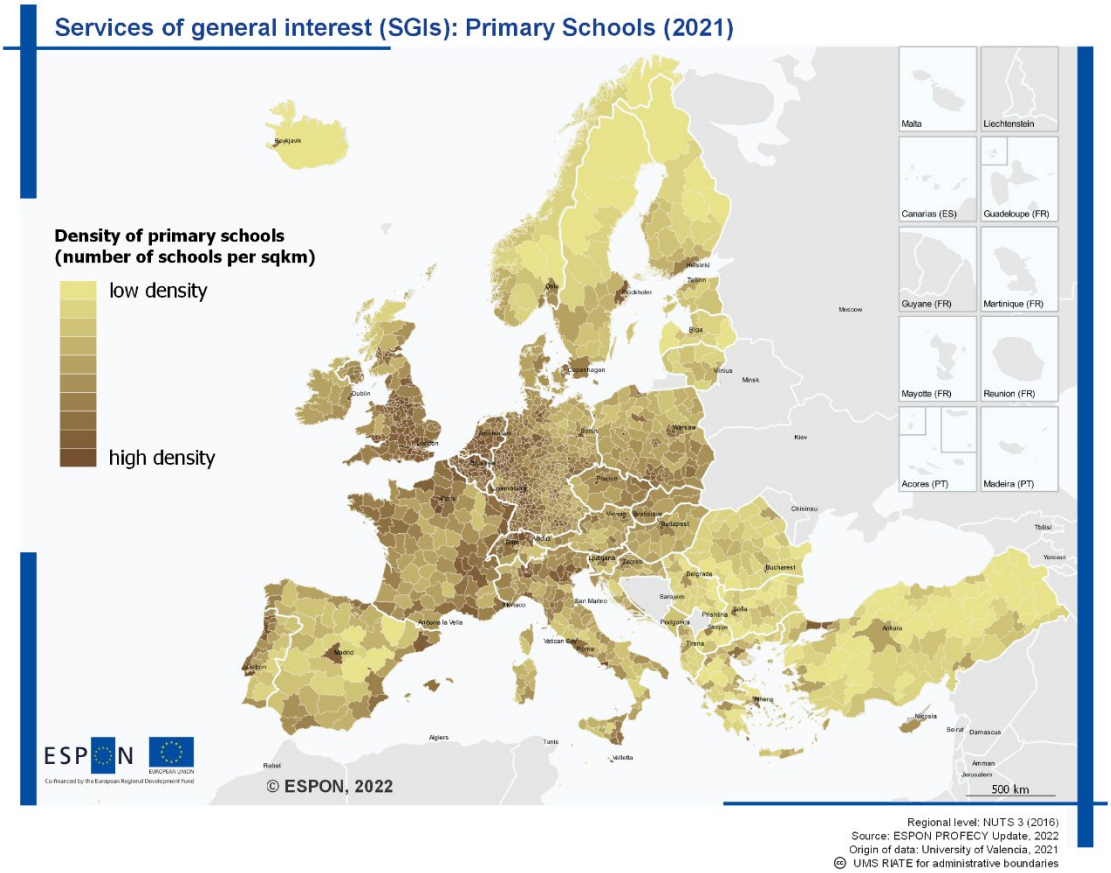


Figure 2-69. Density of Primary Schools in Europe (2021) (2021 NUTS version).

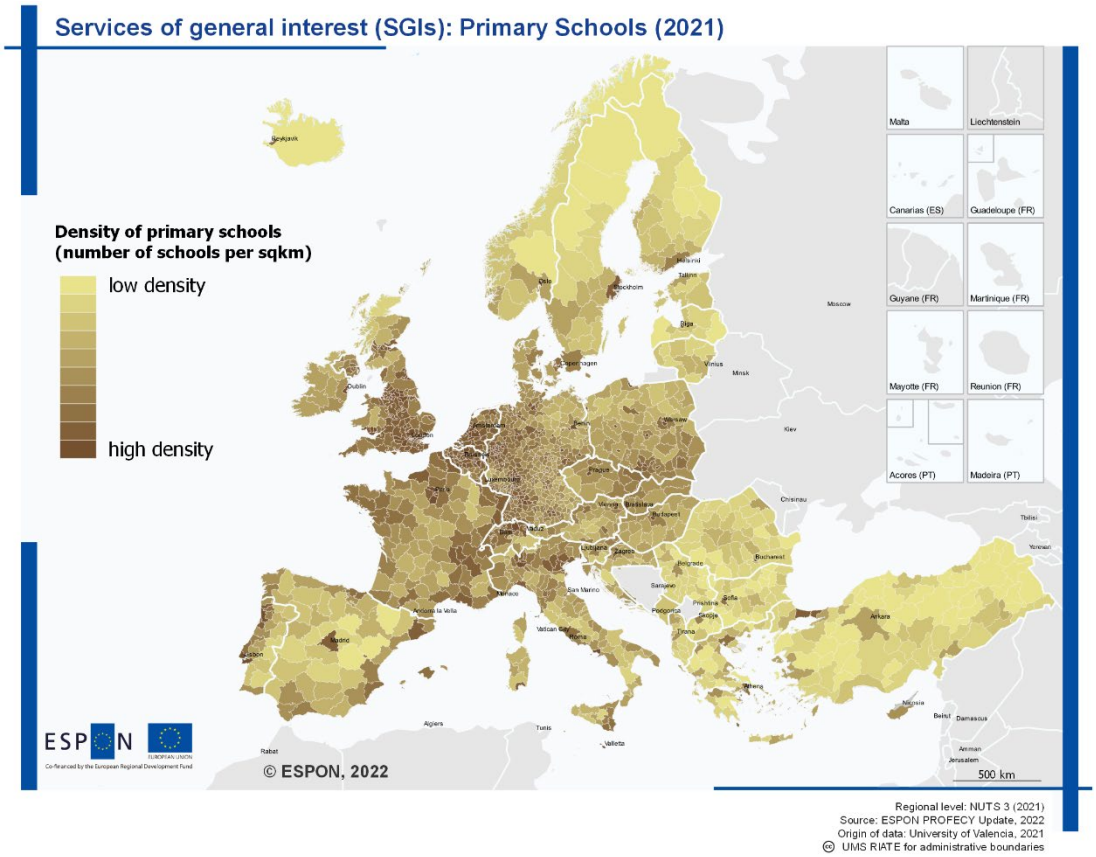


Figure 2-70. Density of Secondary Schools in Europe (2021) (2016 NUTS version).

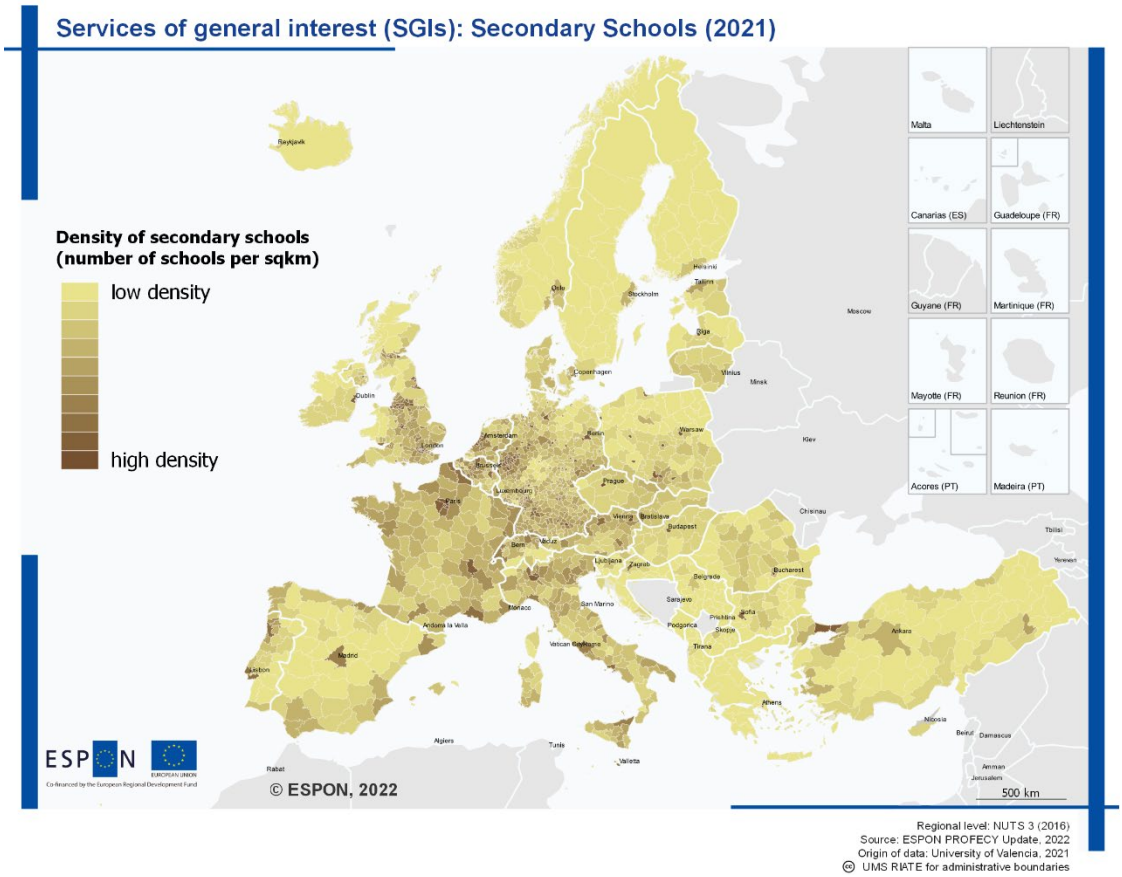


Figure 2-71. Density of Secondary Schools in Europe (2021) (2021 NUTS version).

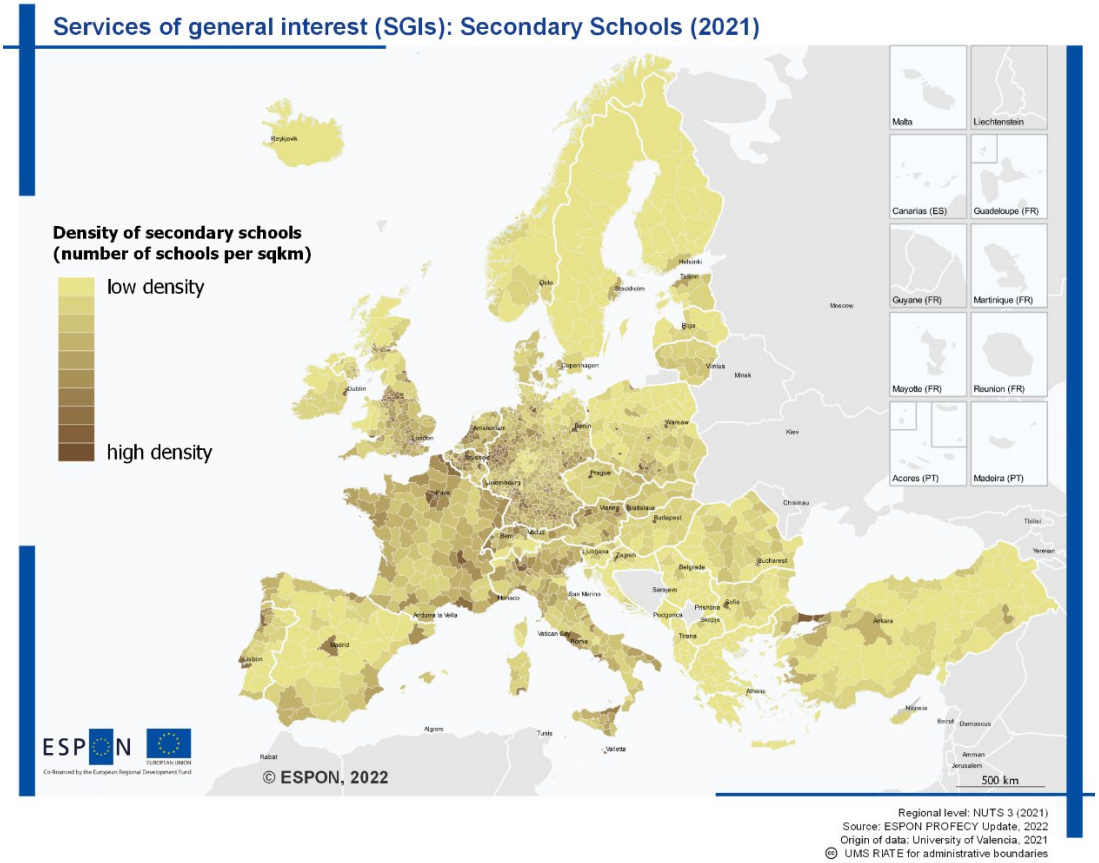


Figure 2-72. Access to primary schools 2021: Travel time by car.

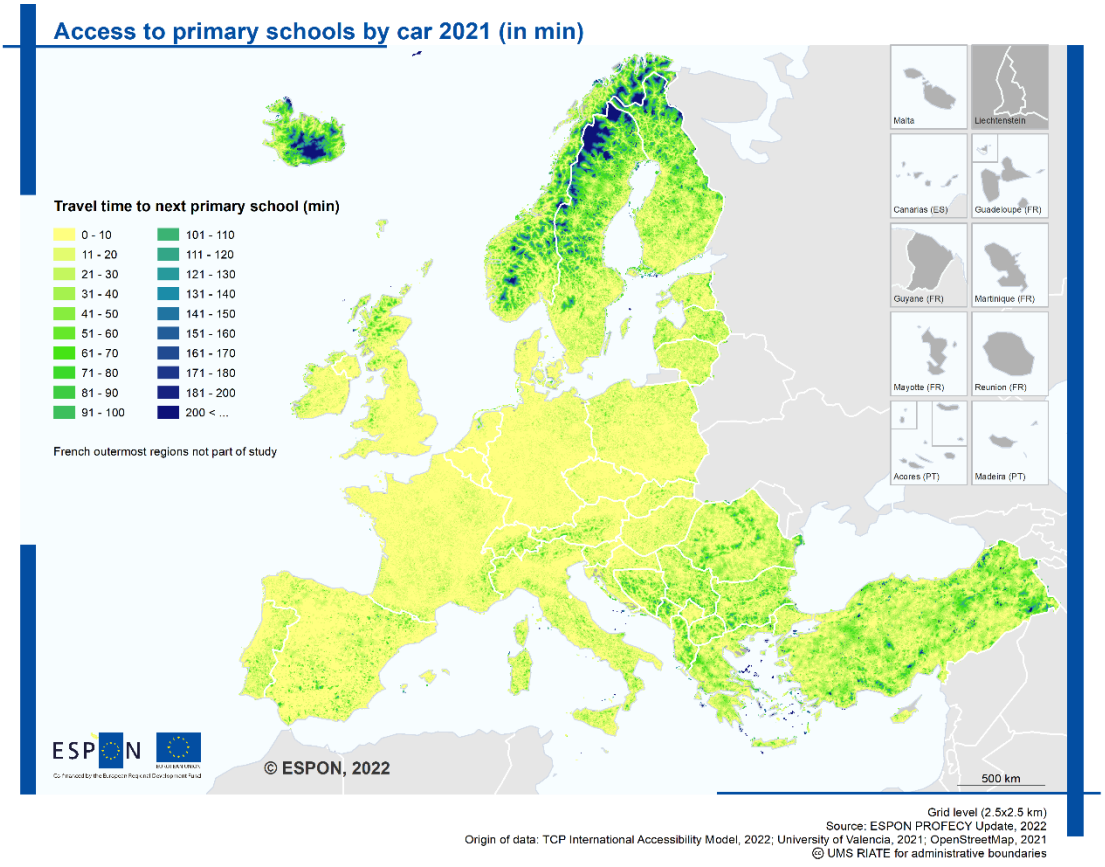
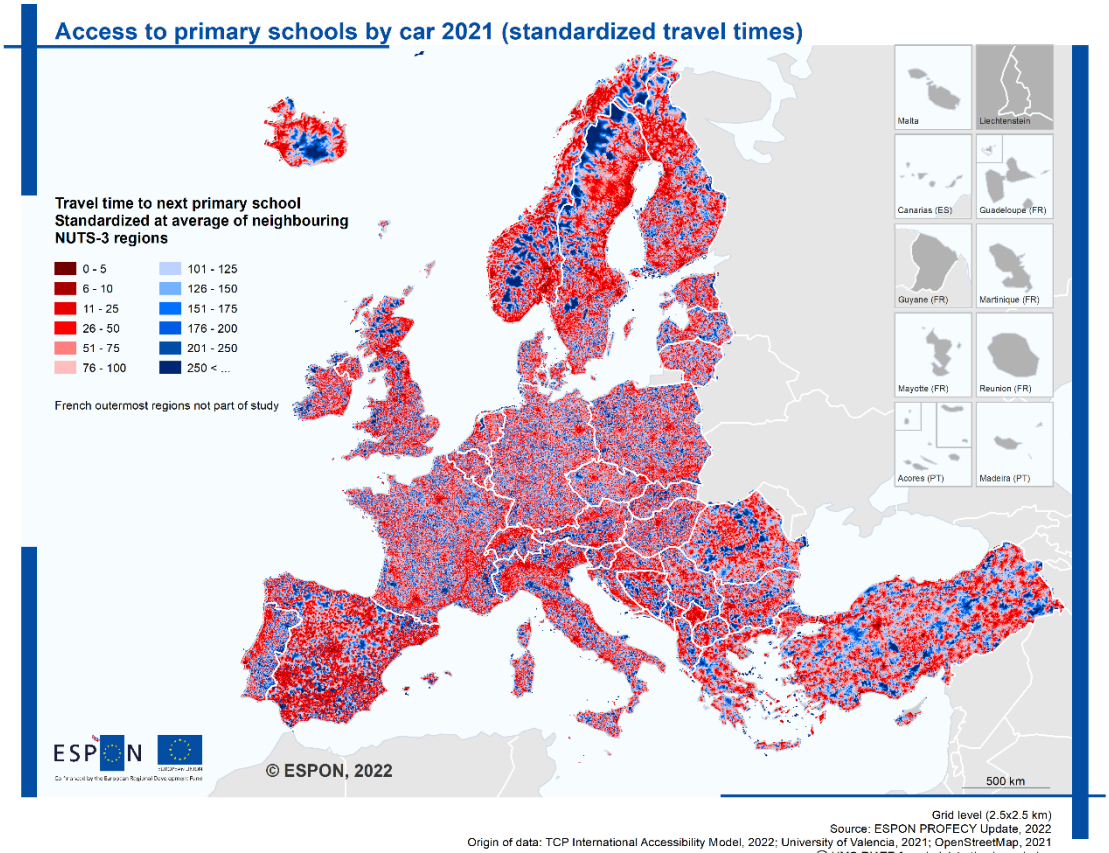


Figure 2-73. Access to primary schools 2021: Standardized travel time by car.



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
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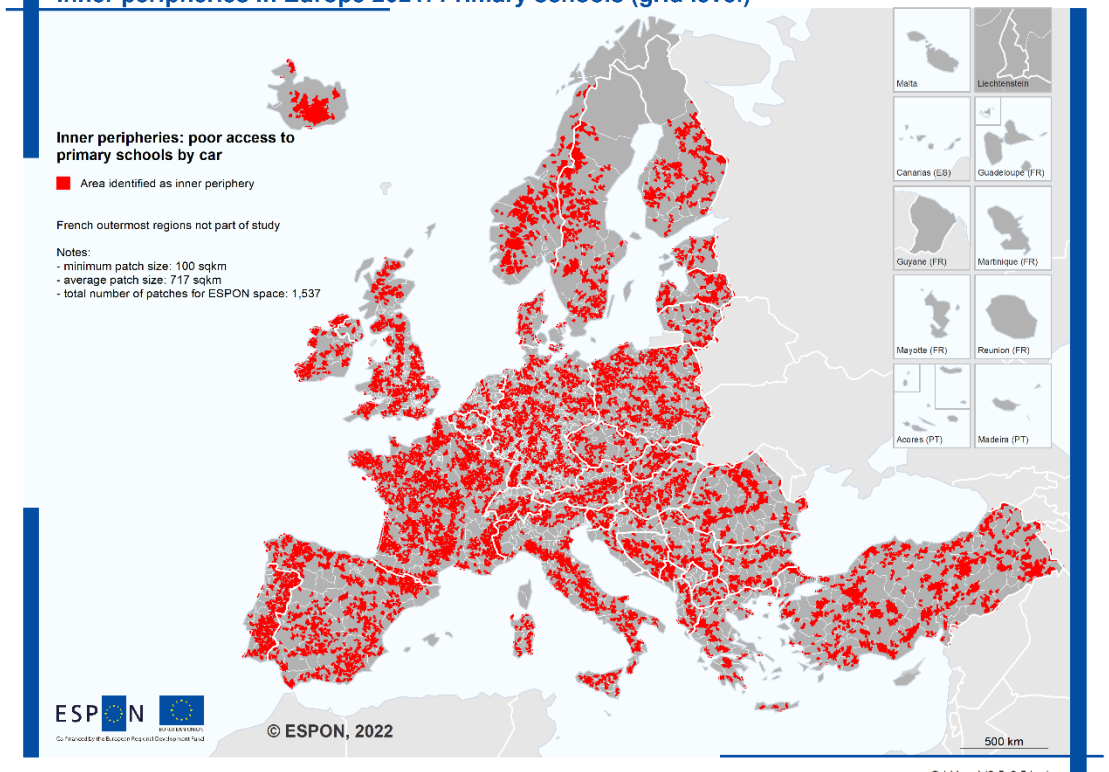
Figure 2-74. Access to primary schools 2021: Inner peripheries (grid level).



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
© UMS RIATE for administrative boundaries

Figure 2-75. Access to primary schools 2021: Overlay of LAU units with IP areas at grid level.

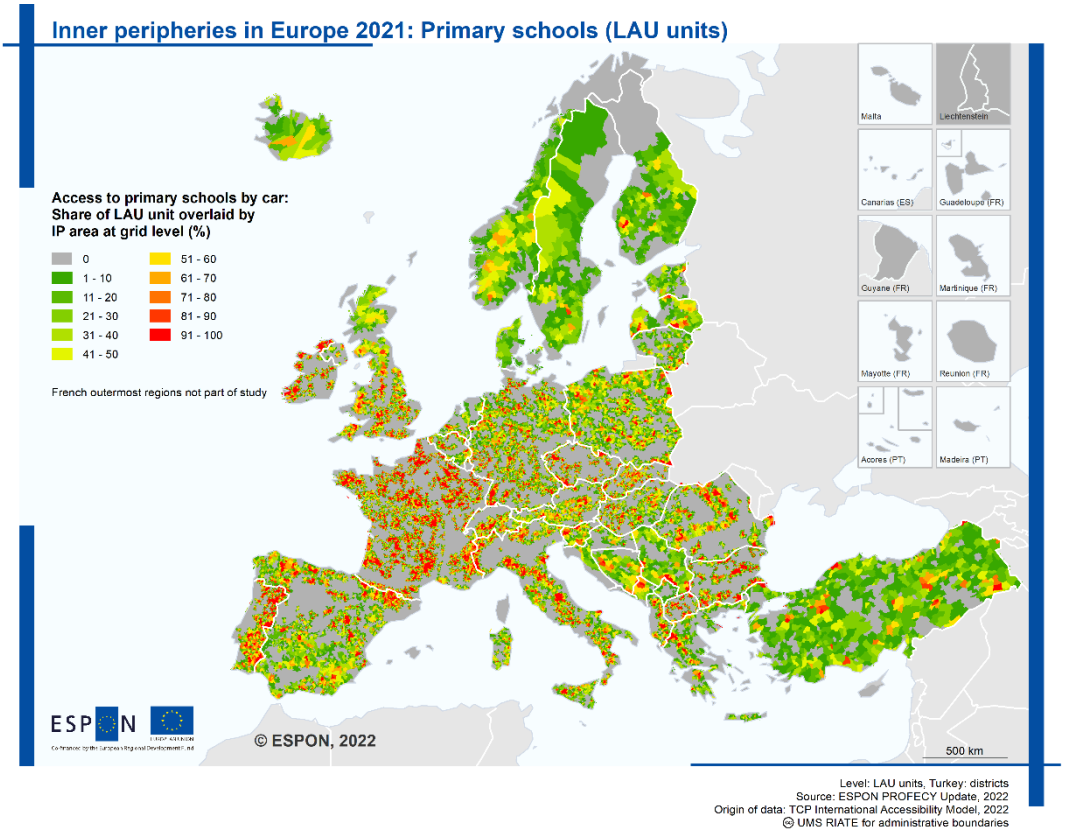


Figure 2-76. Access to primary schools 2021: Identification of LAU units as inner peripheries.

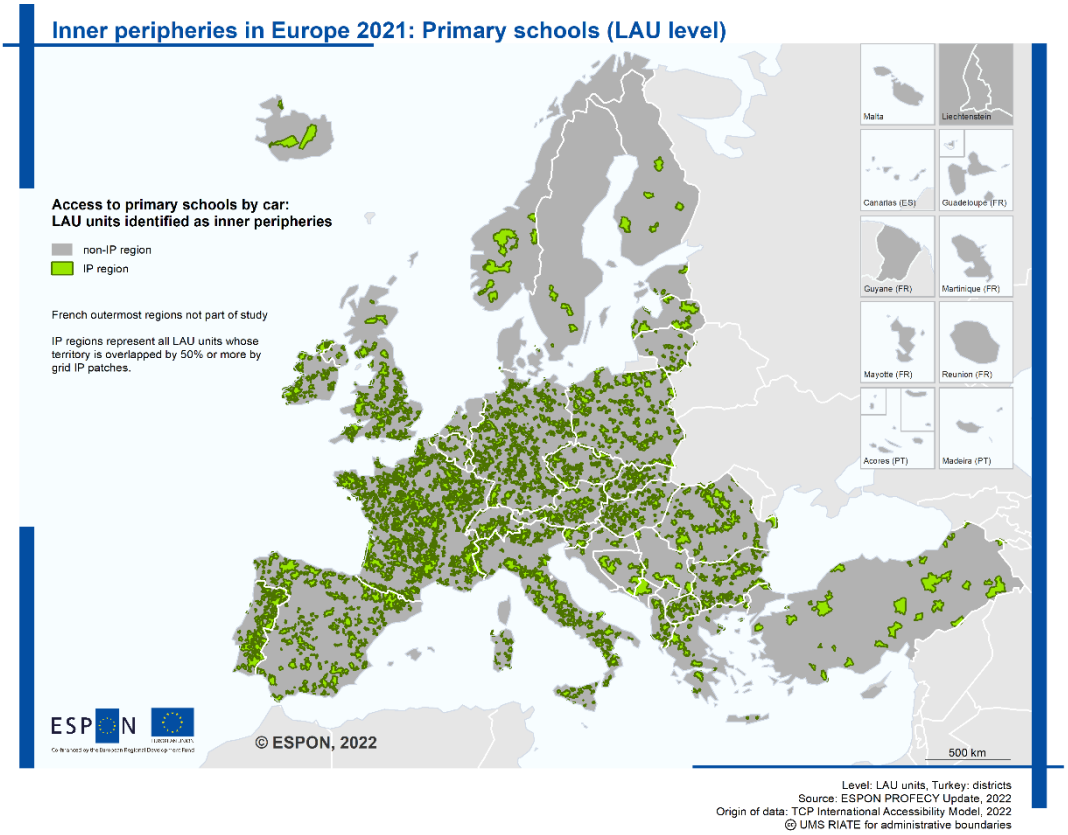


Figure 2-77. Access to primary schools 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version).

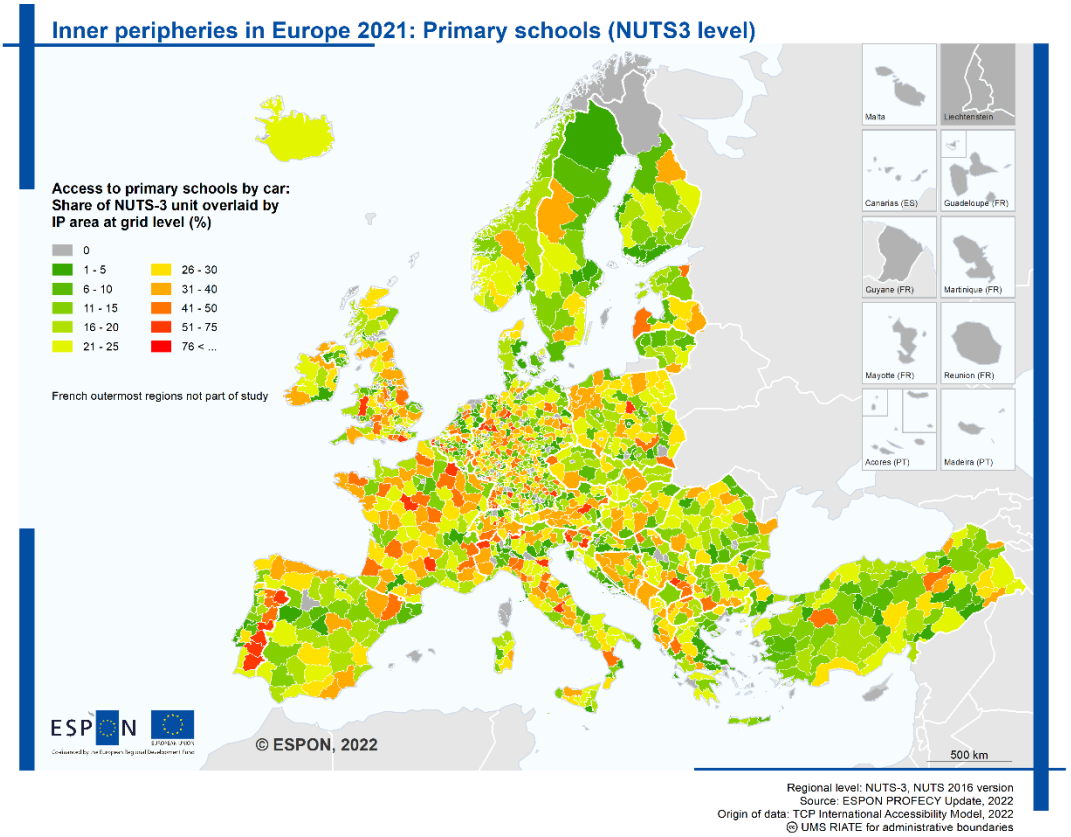


Figure 2-78. Access to primary schools 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version).

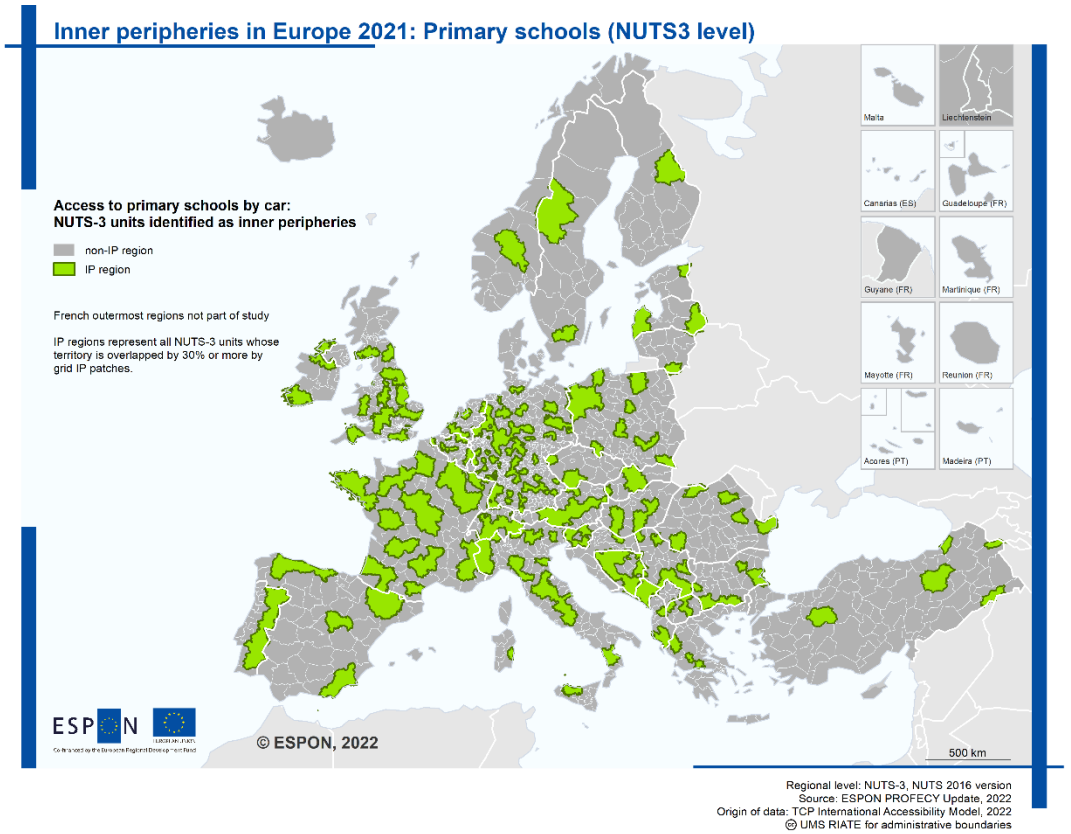


Figure 2-79. Access to primary schools 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version).

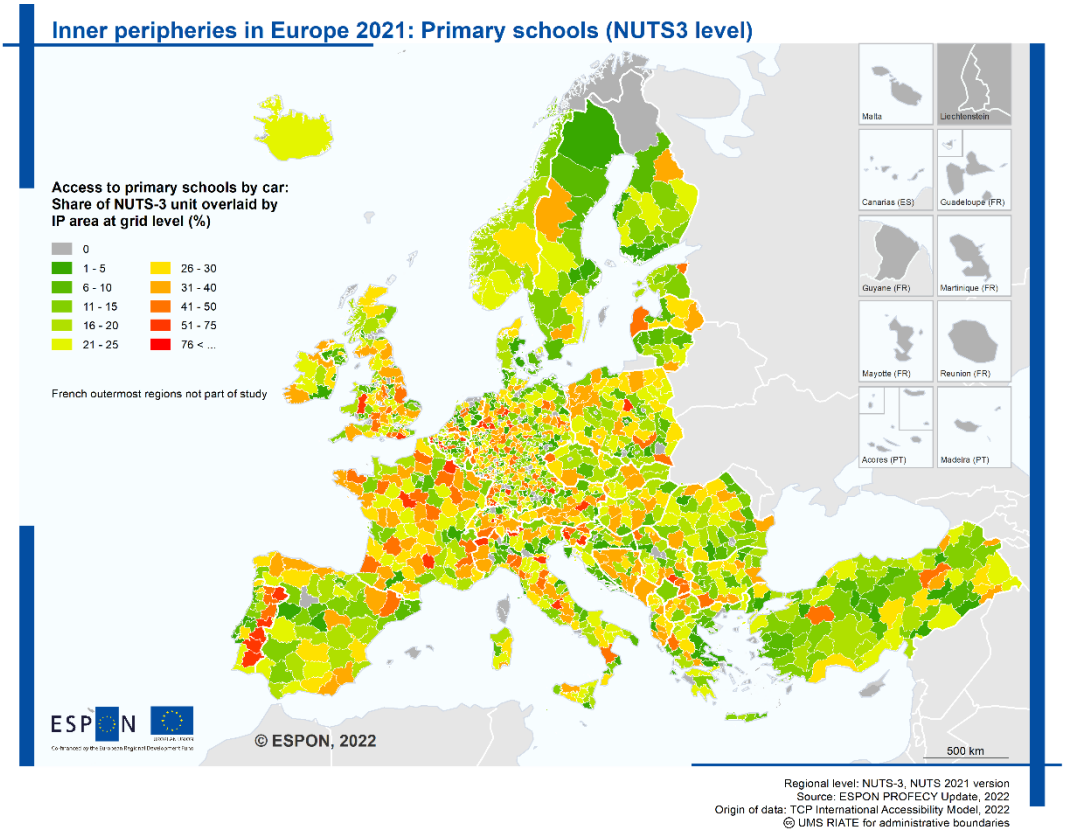


Figure 2-80. Access to primary schools 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version).

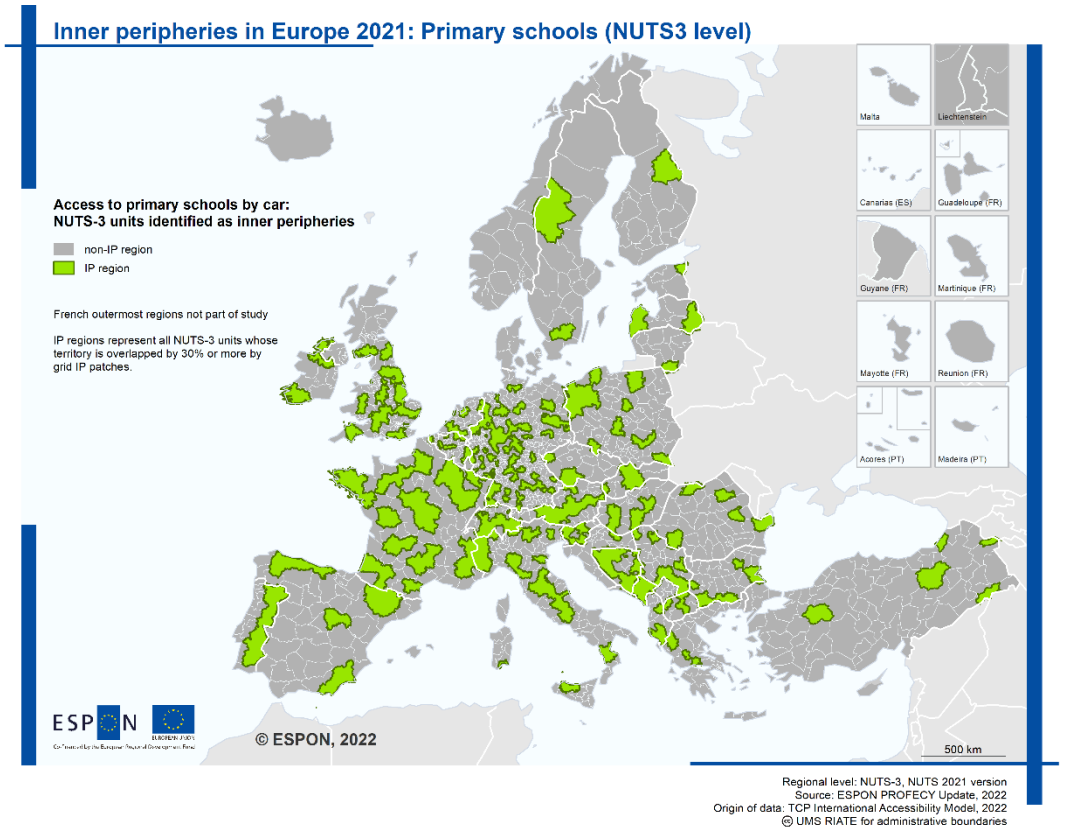


Figure 2-81. Availability of primary schools within 15 minutes car travel time.

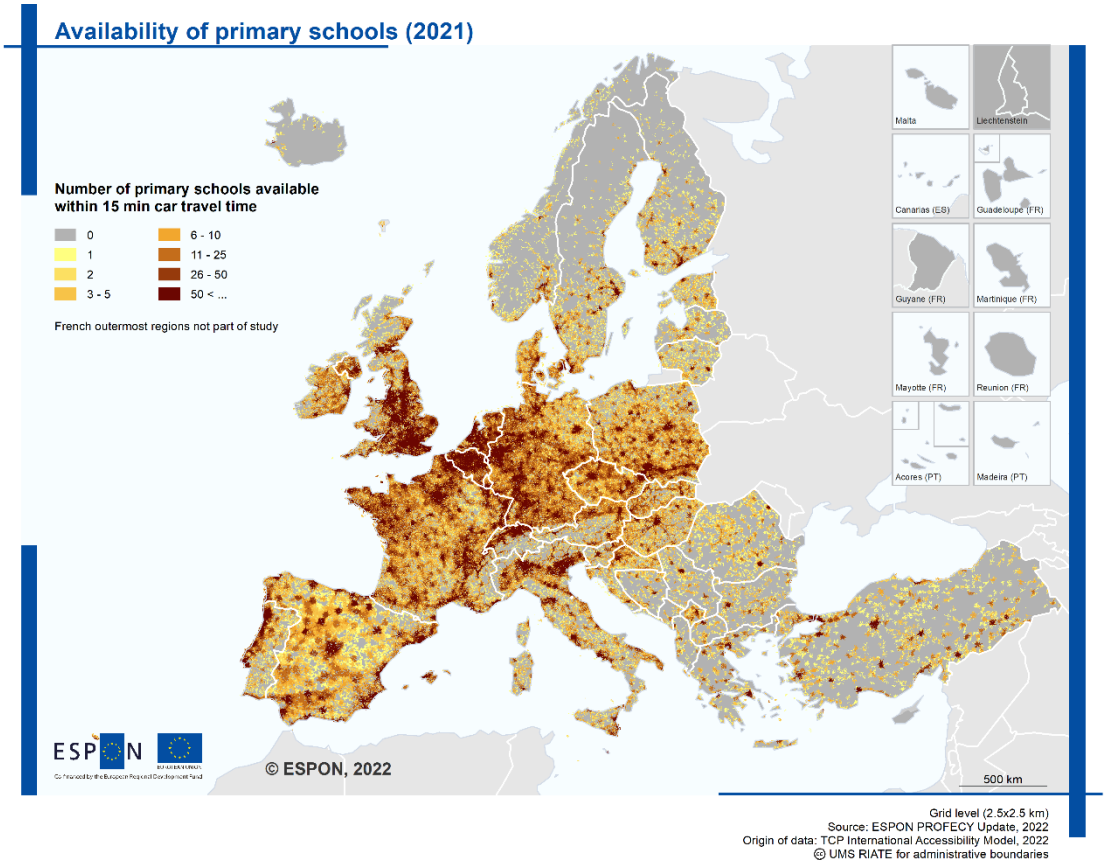


Figure 2-82. Primary schools: Areas of risk to become IP in future.

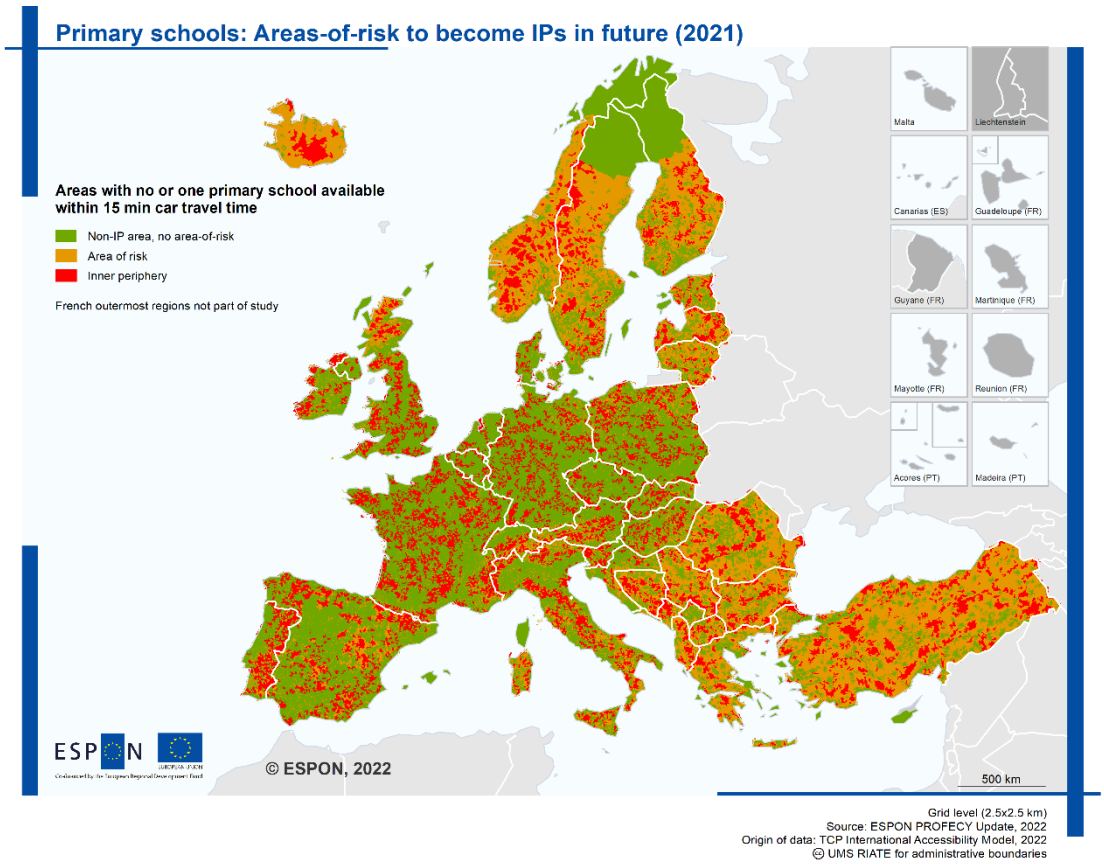
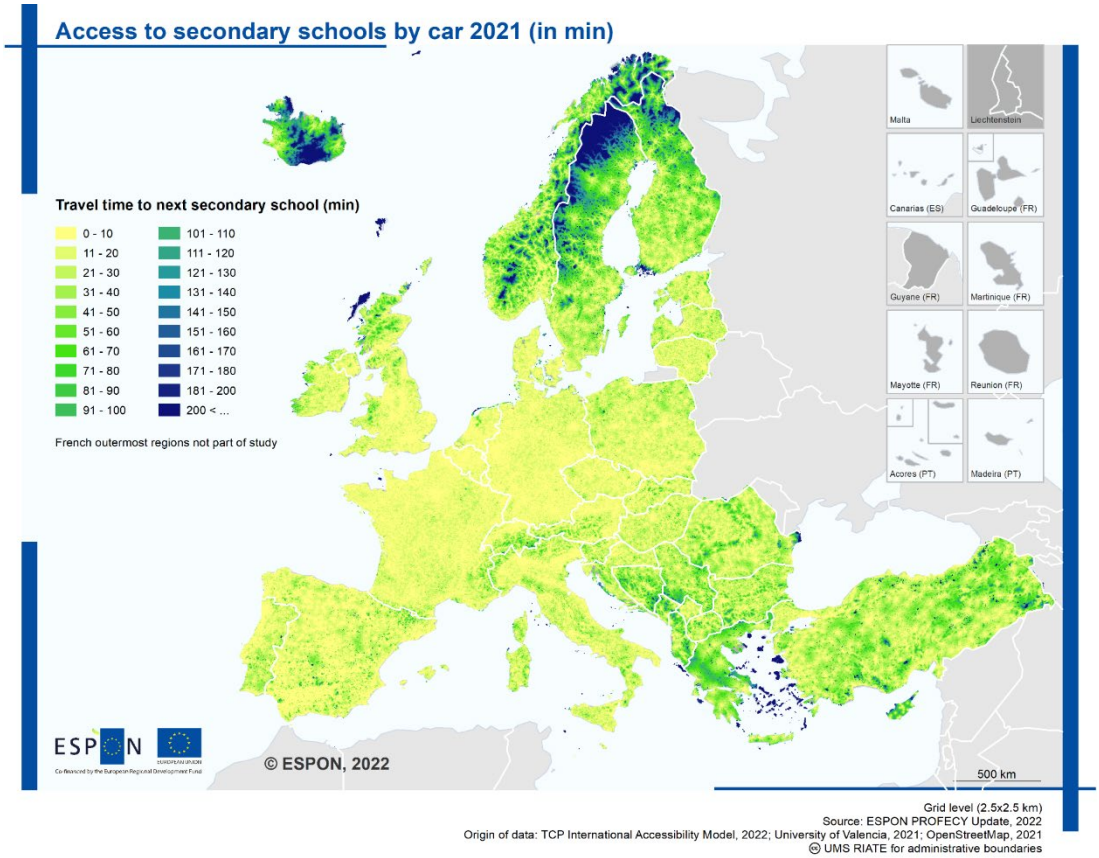
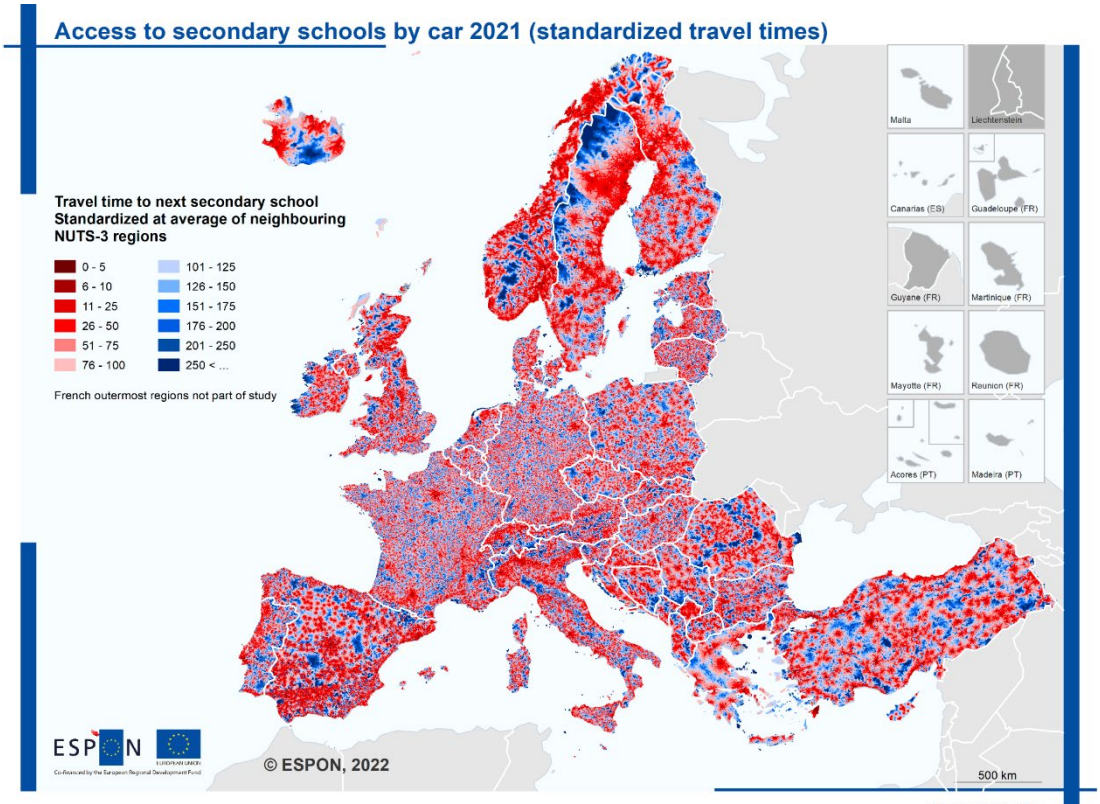


Figure 2-83. Access to secondary schools 2021: Travel time by car.



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
UMS RIATE for administrative boundaries

Figure 2-84. Access to secondary schools 2021: Standardized travel time by car.



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
UMS RIATE for administrative boundaries

Figure 2-85. Access to secondary schools 2021: Inner peripheries (grid level).

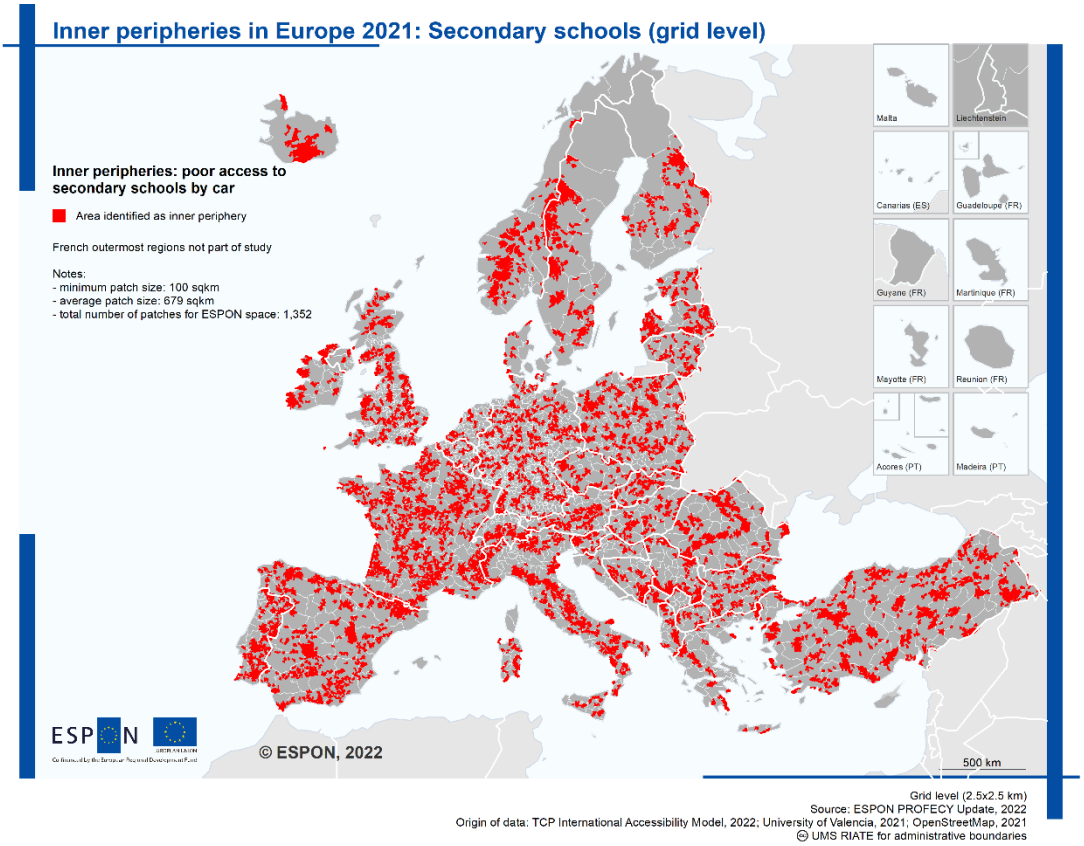


Figure 2-86. Access to secondary schools 2021: Overlay of LAU units with IP areas at grid level.

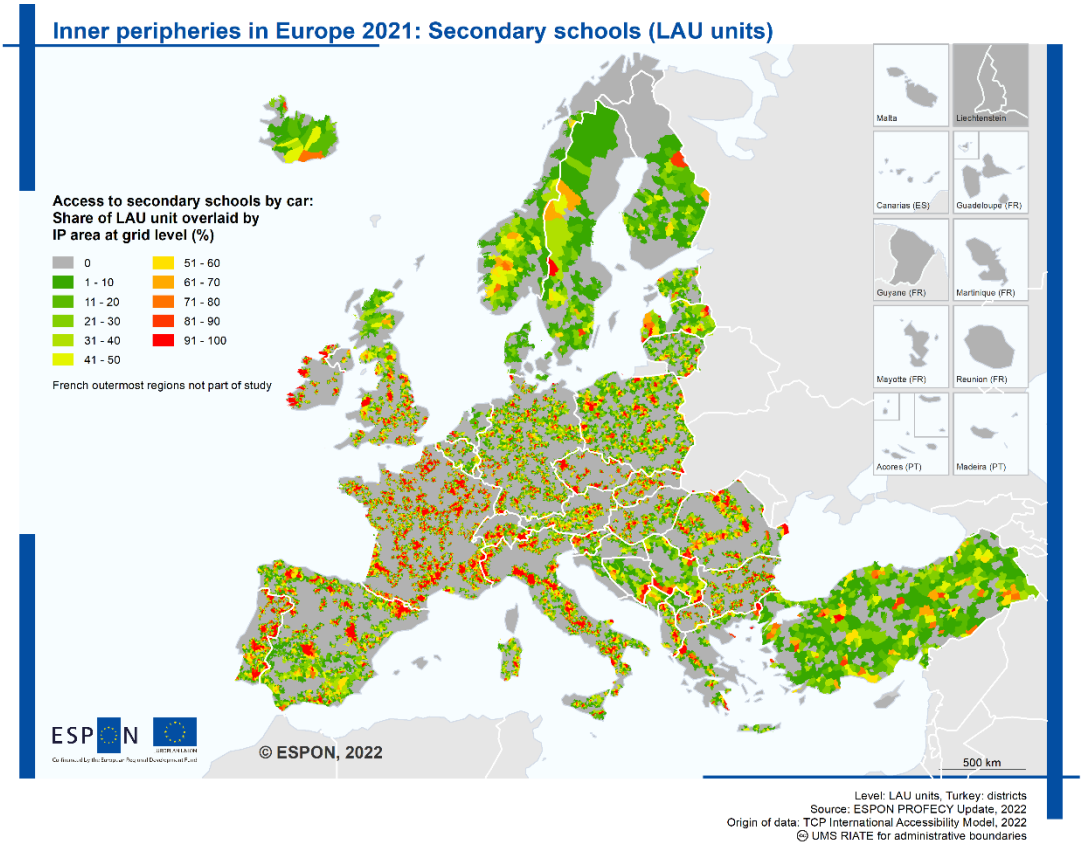


Figure 2-87. Access to secondary schools 2021: Identification of LAU units as inner peripheries.

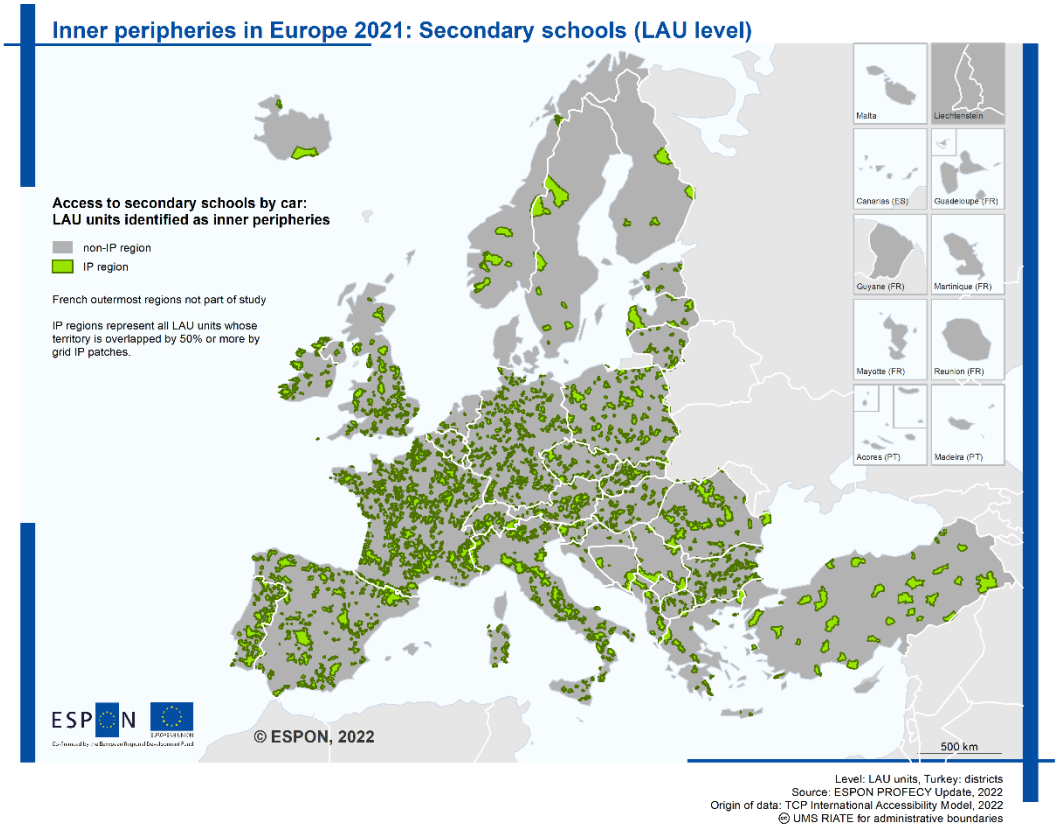


Figure 2-88. Access to secondary schools 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version).

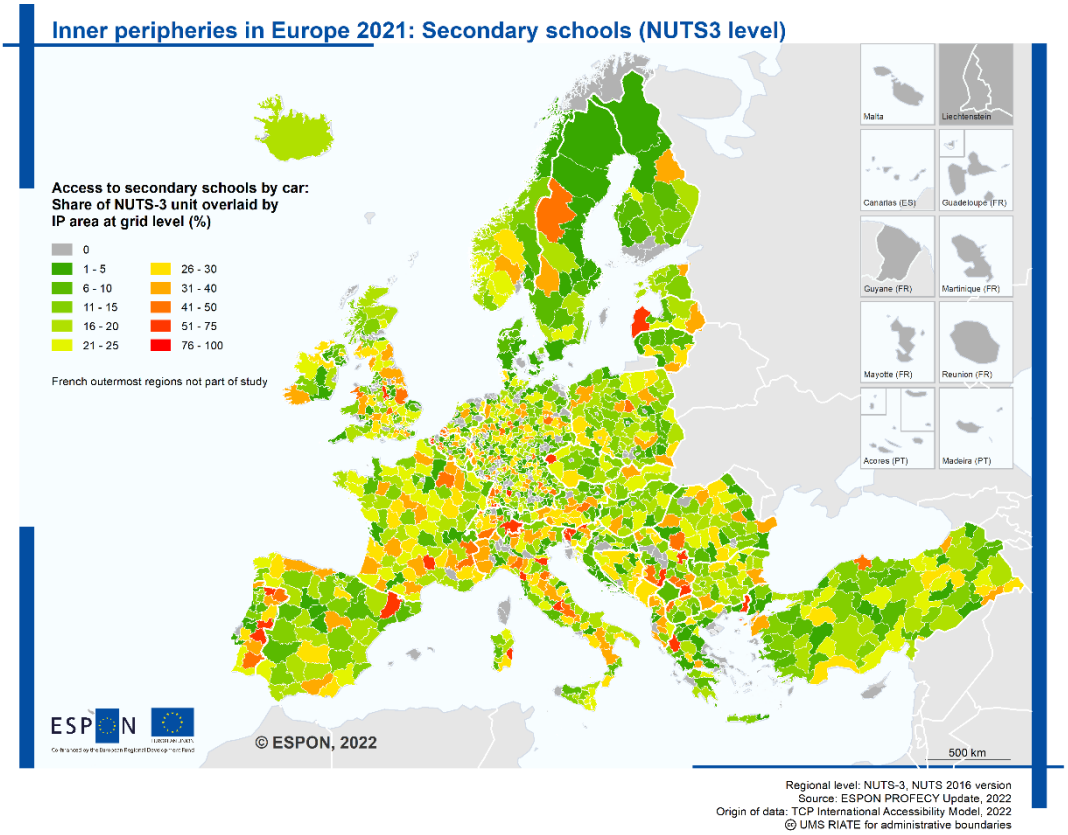


Figure 2-89. Access to secondary schools 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version).

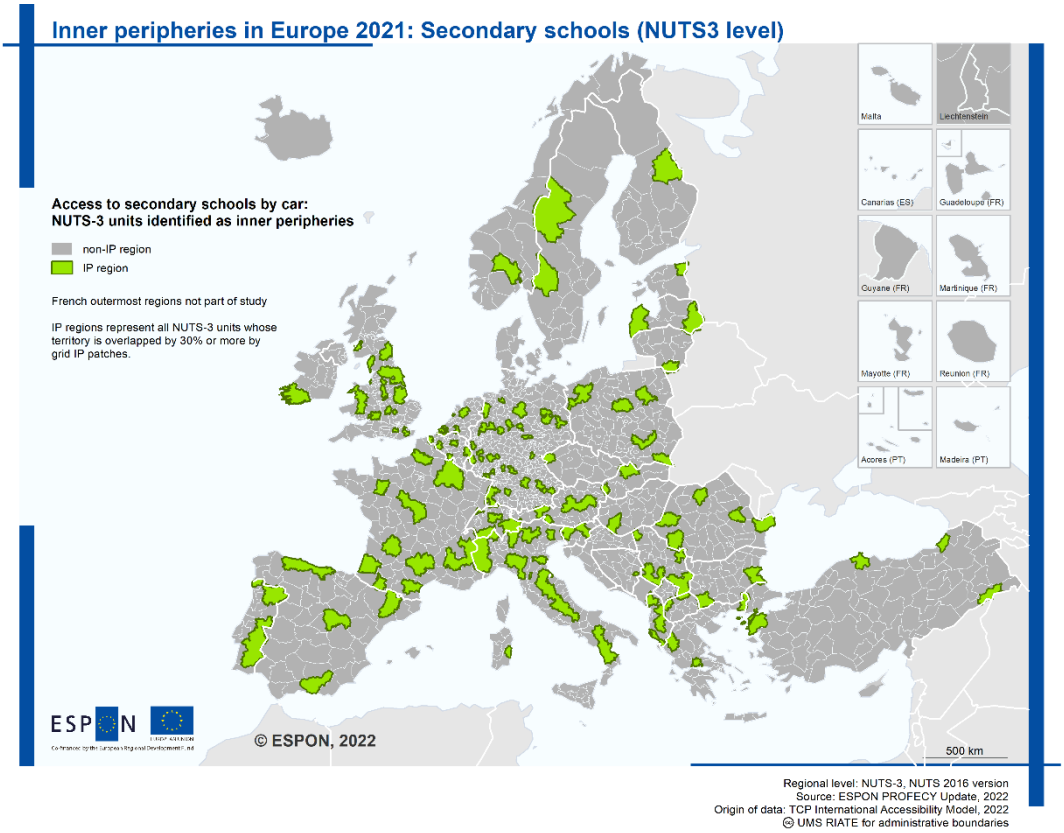


Figure 2-90. Access to secondary schools 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version).

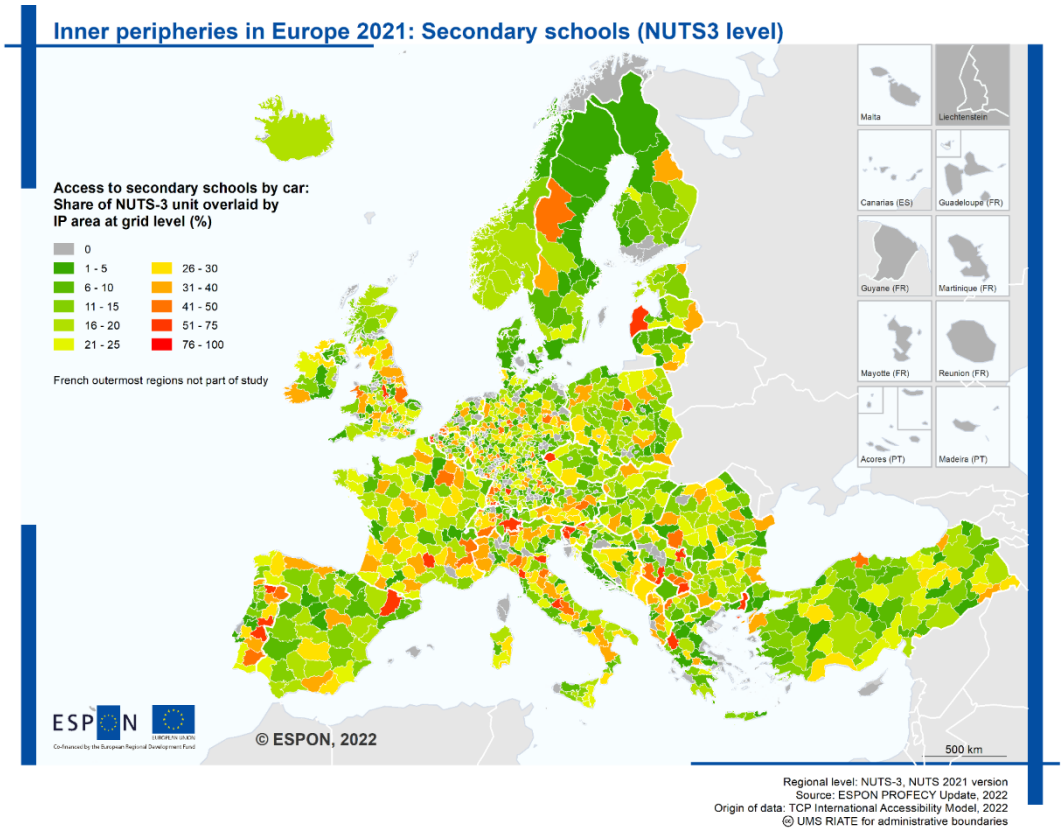


Figure 2-91. Access to secondary schools 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version).

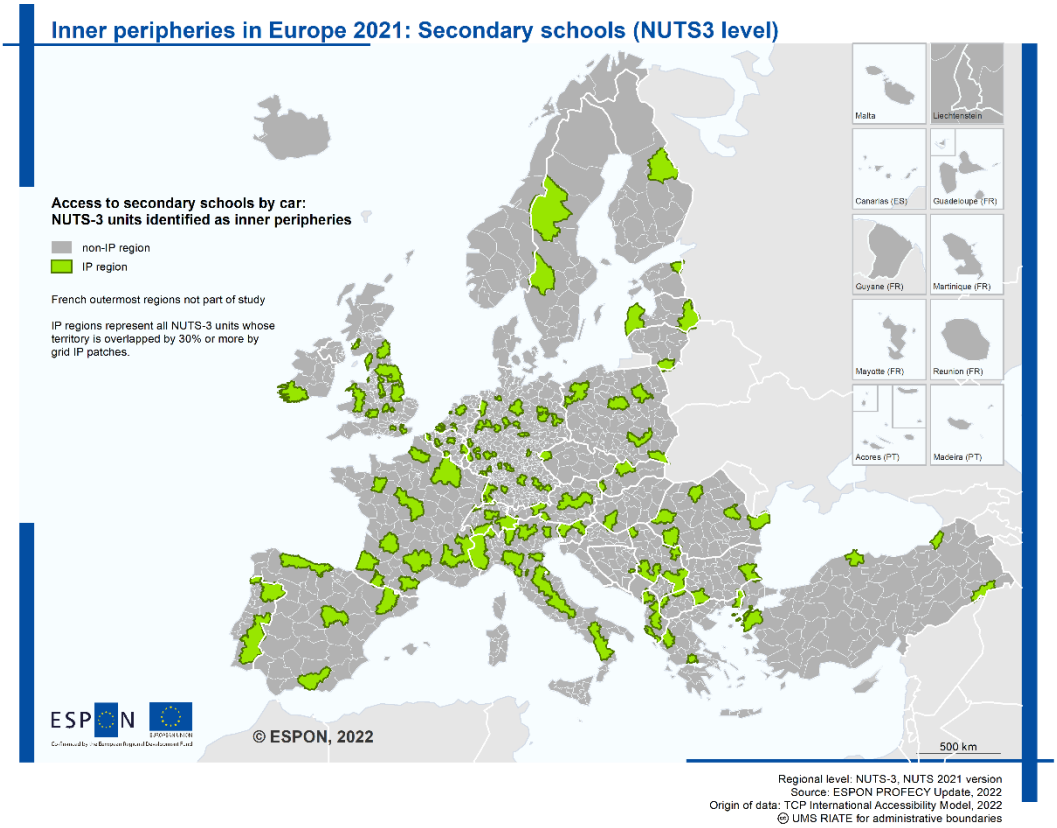


Figure 2-92. Availability of secondary schools within 60 minutes car travel time.

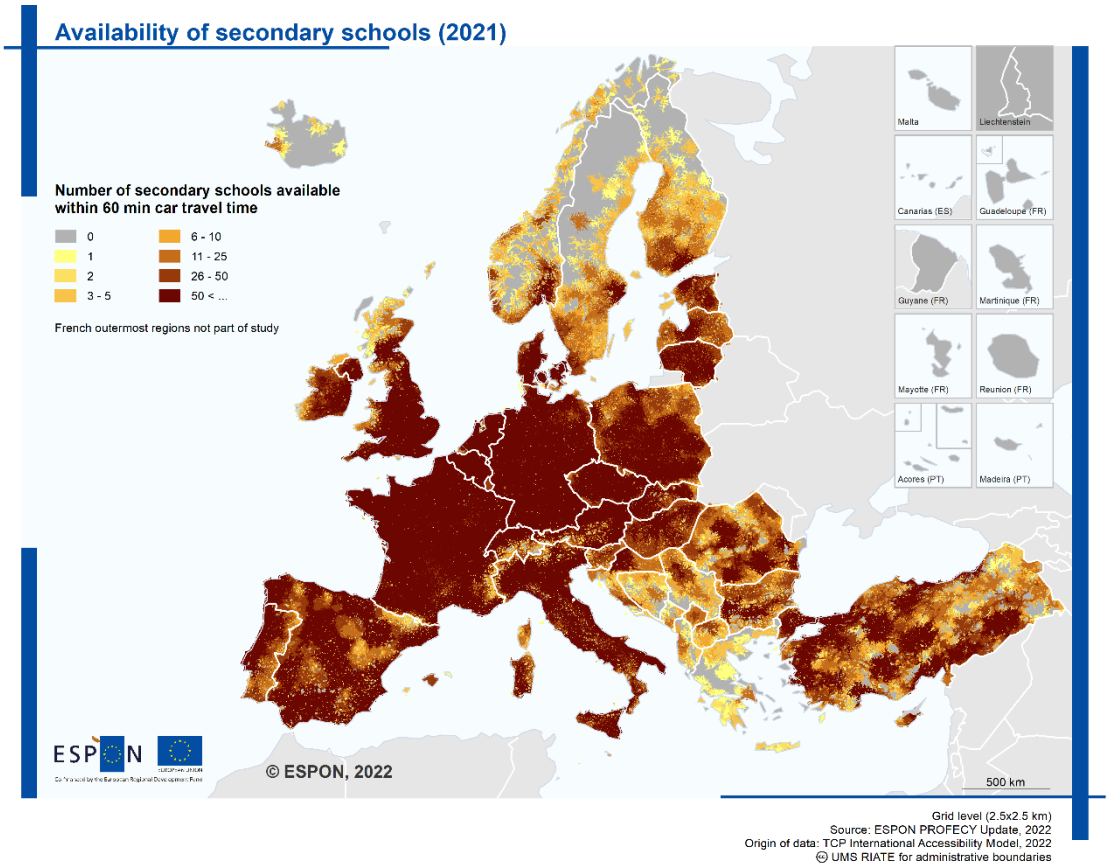
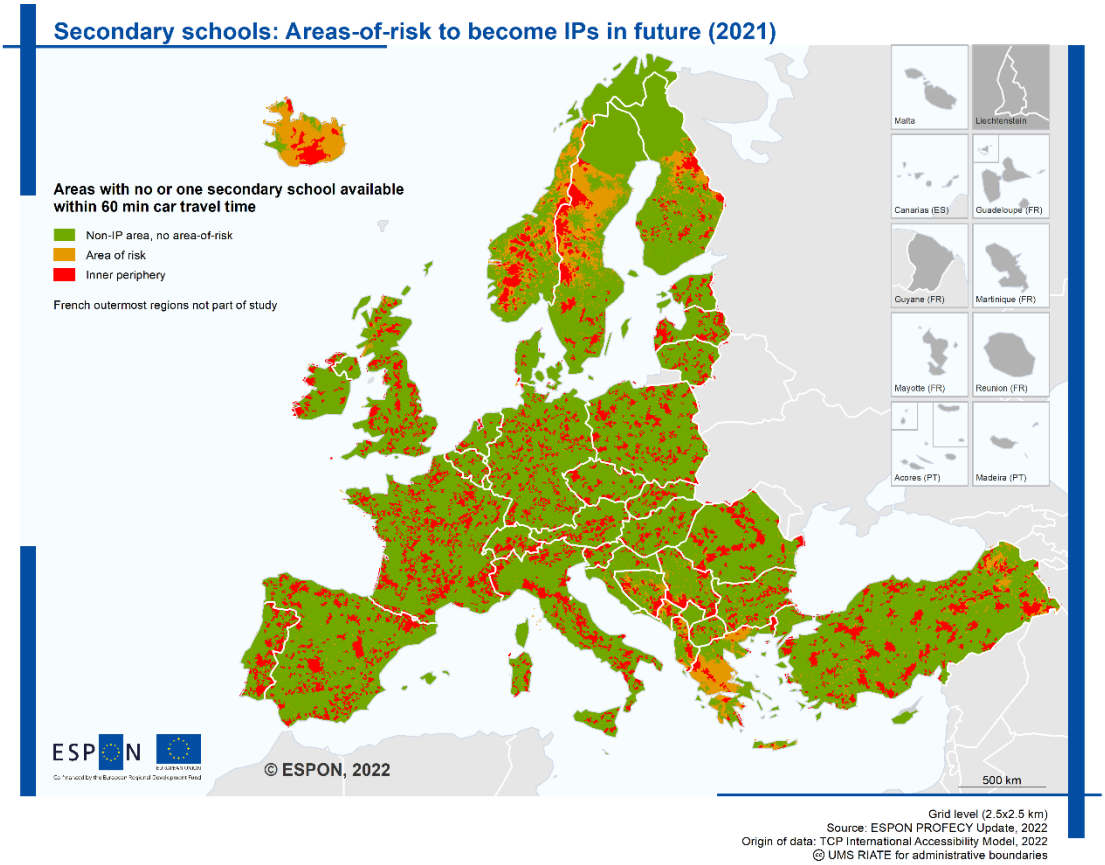


Figure 2-93. Secondary schools: Areas of risk to become IP in future.



2.5 Train stations

The following maps have been generated as part of the delineation process:

- Passenger train stations in Europe
- Access to train stations 2021: Travel time by car
- Access to train stations 2021: Standardized travel time by car
- Access to train stations 2021: Delineation of inner peripheries at grid level
- Access to train stations 2021: Overlay of LAU units with IP areas at grid level
- Access to train stations 2021: Identification of LAU units as inner peripheries
- Access to train stations 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 version)
- Access to train stations 2021: Identification of NUTS-3 regions as inner peripheries (2016 version)
- Access to train stations 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 version)
- Access to train stations 2021: Identification of NUTS-3 regions as inner peripheries (2021 version)
- Availability of train stations within 20 minutes car travel time
- Passenger train stations: Areas of risk to become IP in future

Countries without railway networks:
Some European countries do not have any railway networks: Andorra, Cyprus, Iceland, and Malta. In case of Andorra, access to train stations in the neighbouring countries of France and Spain have been considered; in case of Cyprus, Iceland, and Malta access to railway systems of neighbouring countries is not possible to due to their isolated island location. Therefore, these countries have been excluded for this analysis.

Figure 2-94. Passenger train stations in Europe.

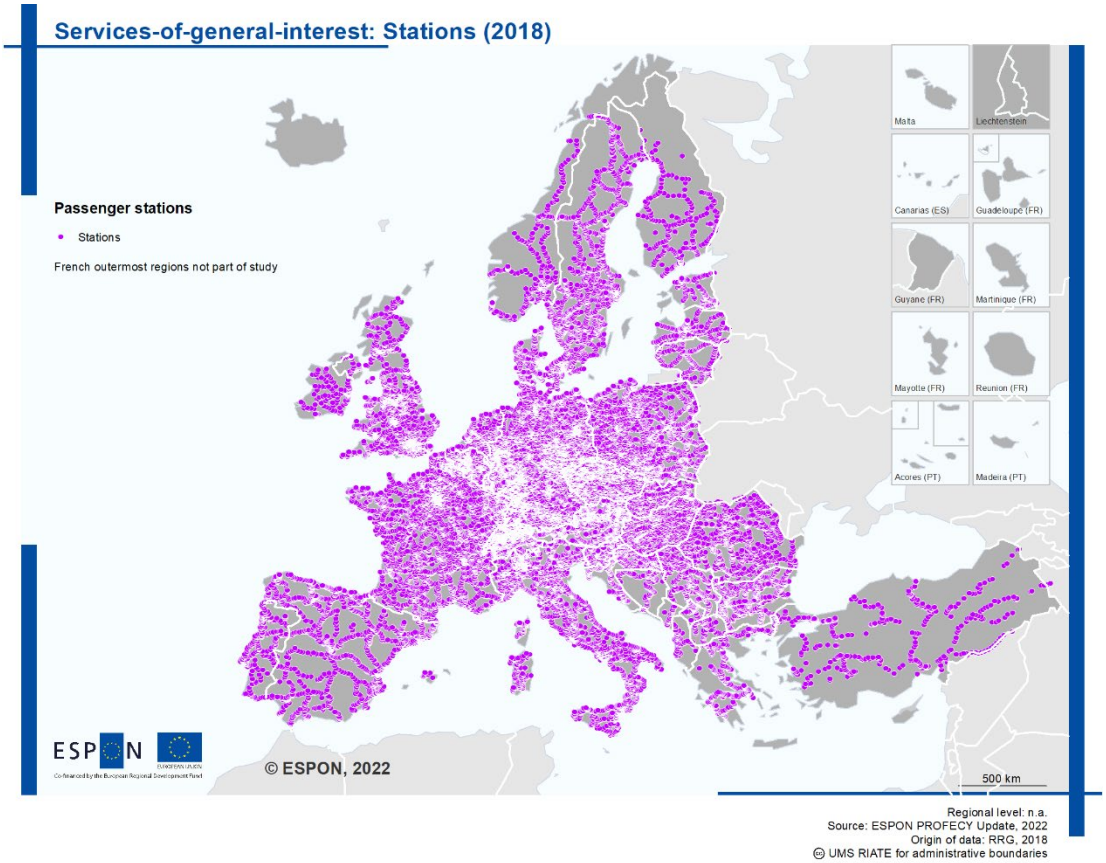


Figure 2-95. Access to train stations 2021: travel time by car.

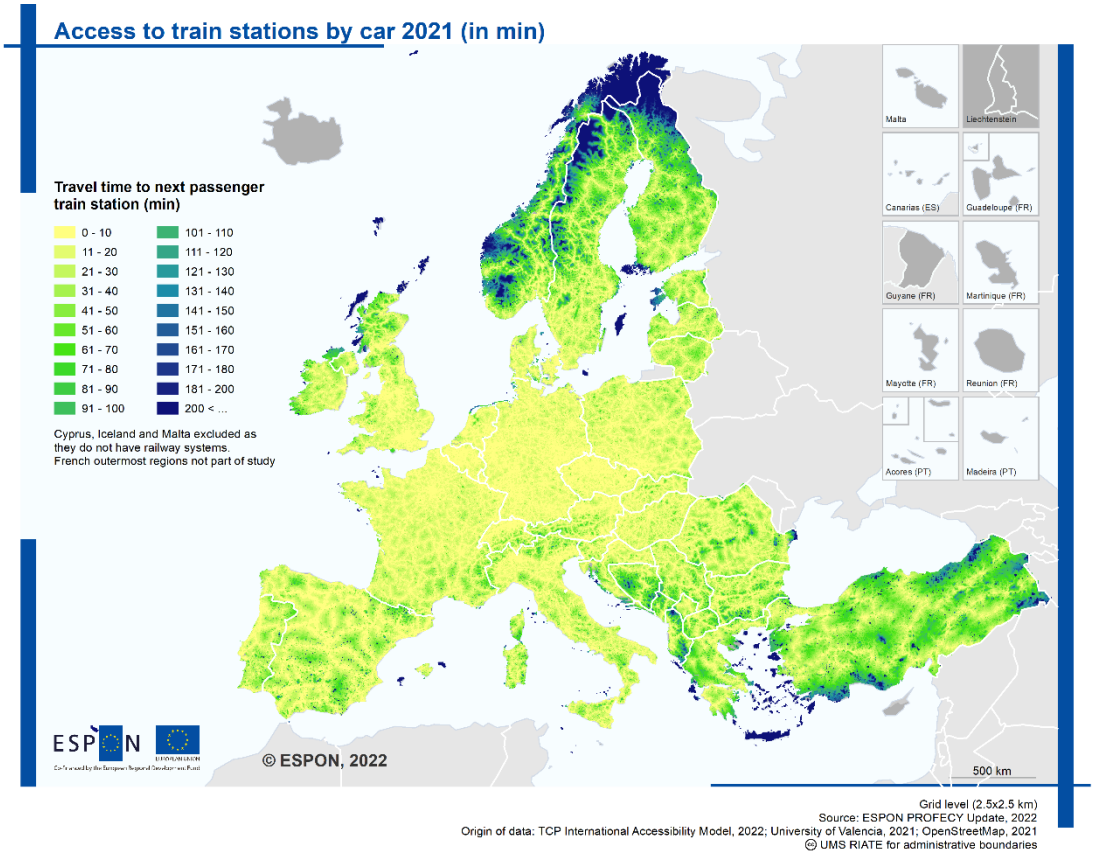
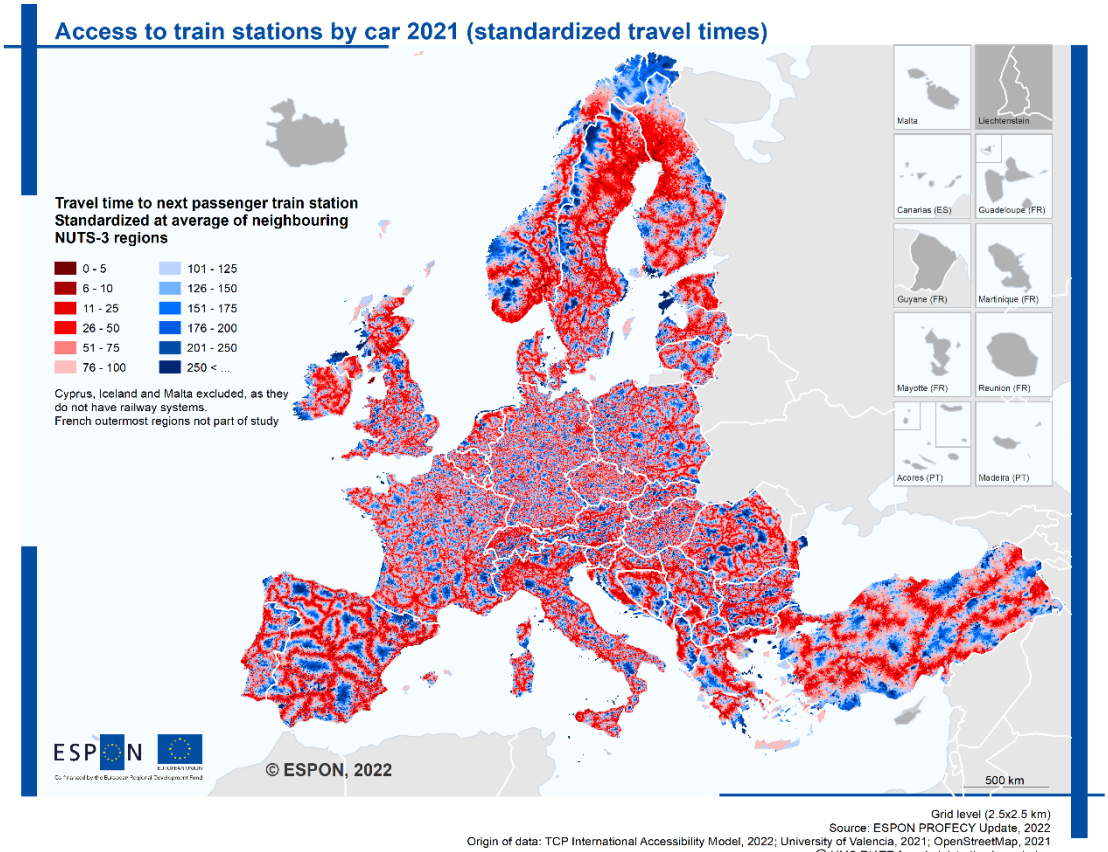
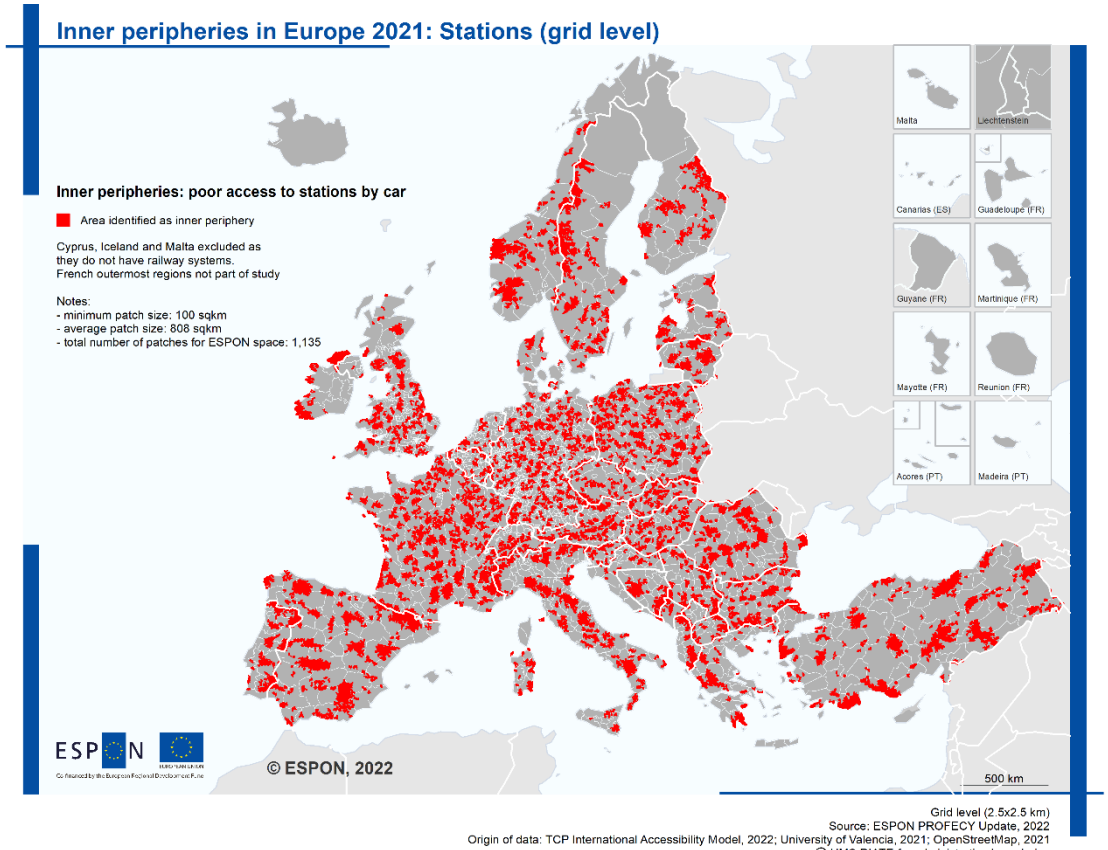


Figure 2-96. Access to train stations 2021: Standardized travel time by car.



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
© UMS RIATE for administrative boundaries

Figure 2-97. Access to train stations 2021: Inner peripheries (grid level).



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
© UMS RIATE for administrative boundaries

Figure 2-98. Access to stations 2021: Overlay of LAU units with IP areas at grid level.

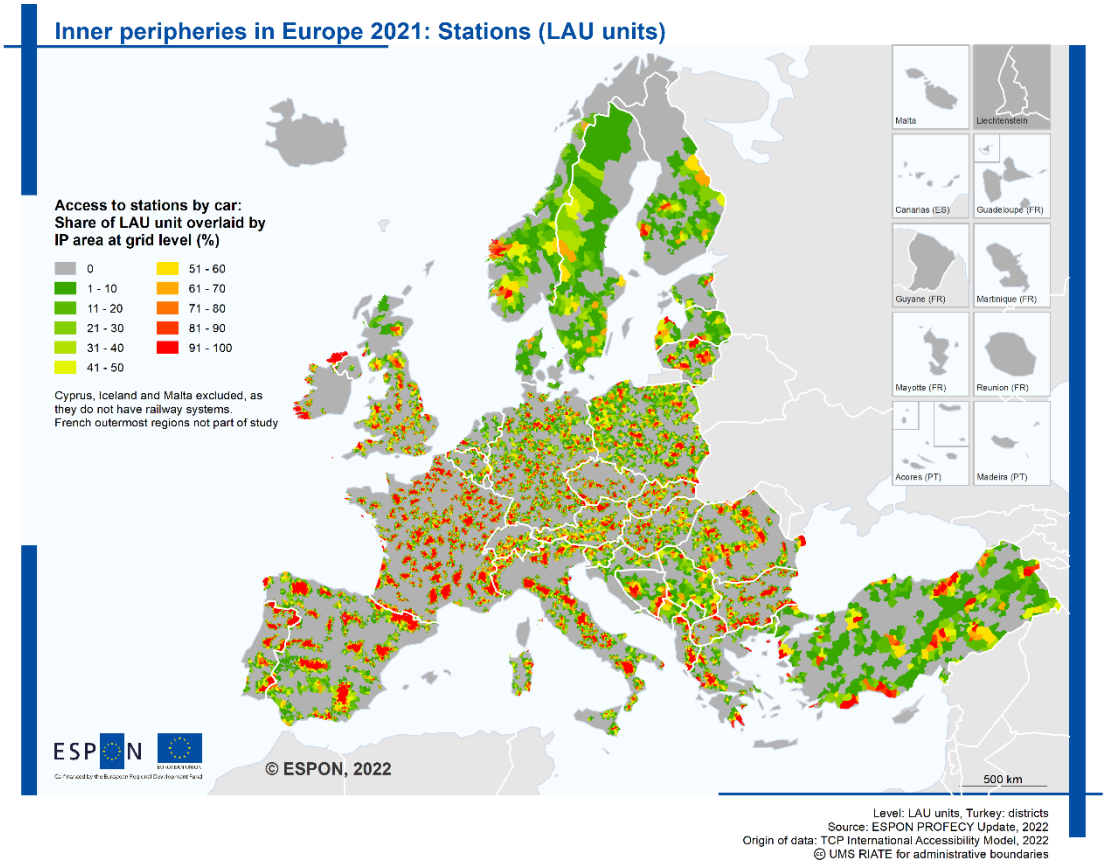


Figure 2-99. Access to stations 2021: Identification of LAU units as inner peripheries.

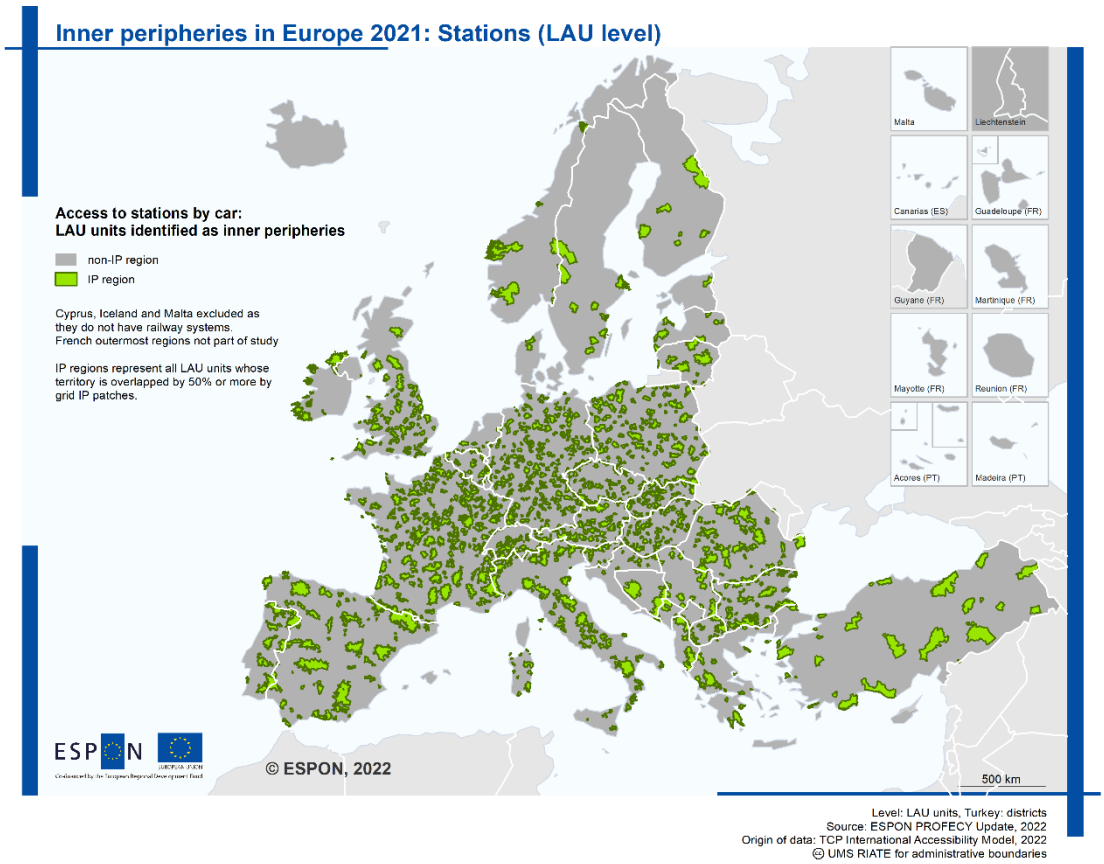


Figure 2-100. Access to train stations 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version).

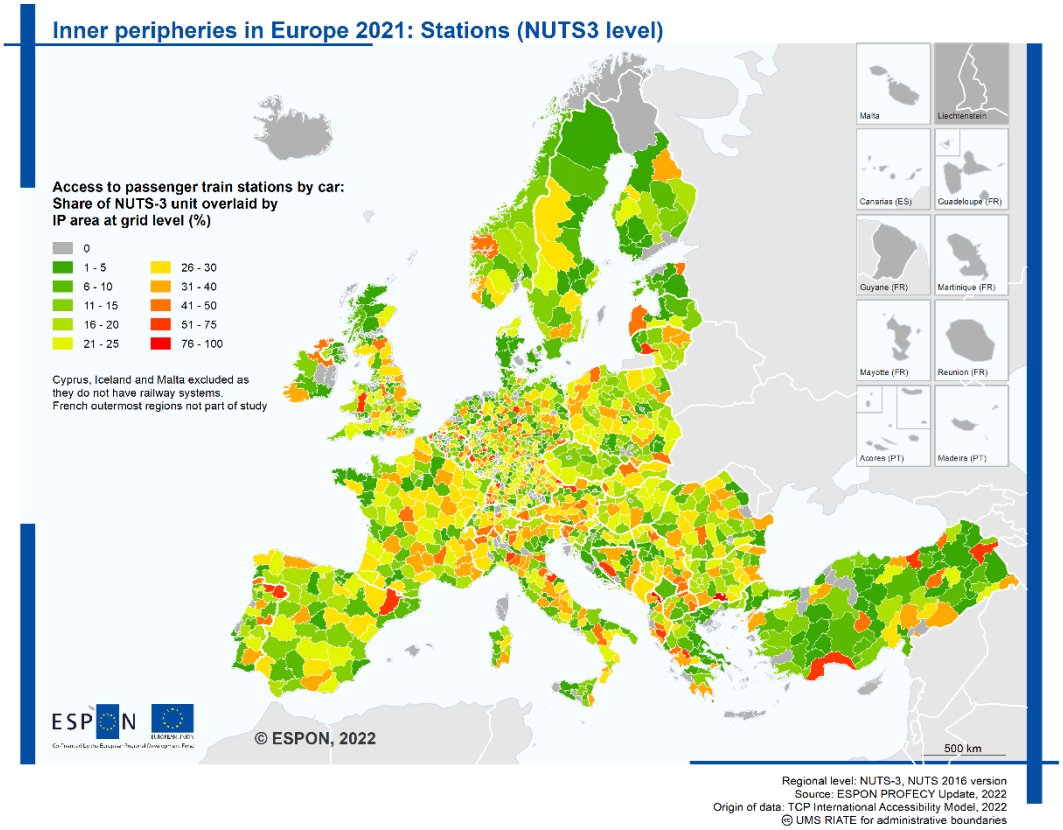


Figure 2-101. Access to train stations 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version).

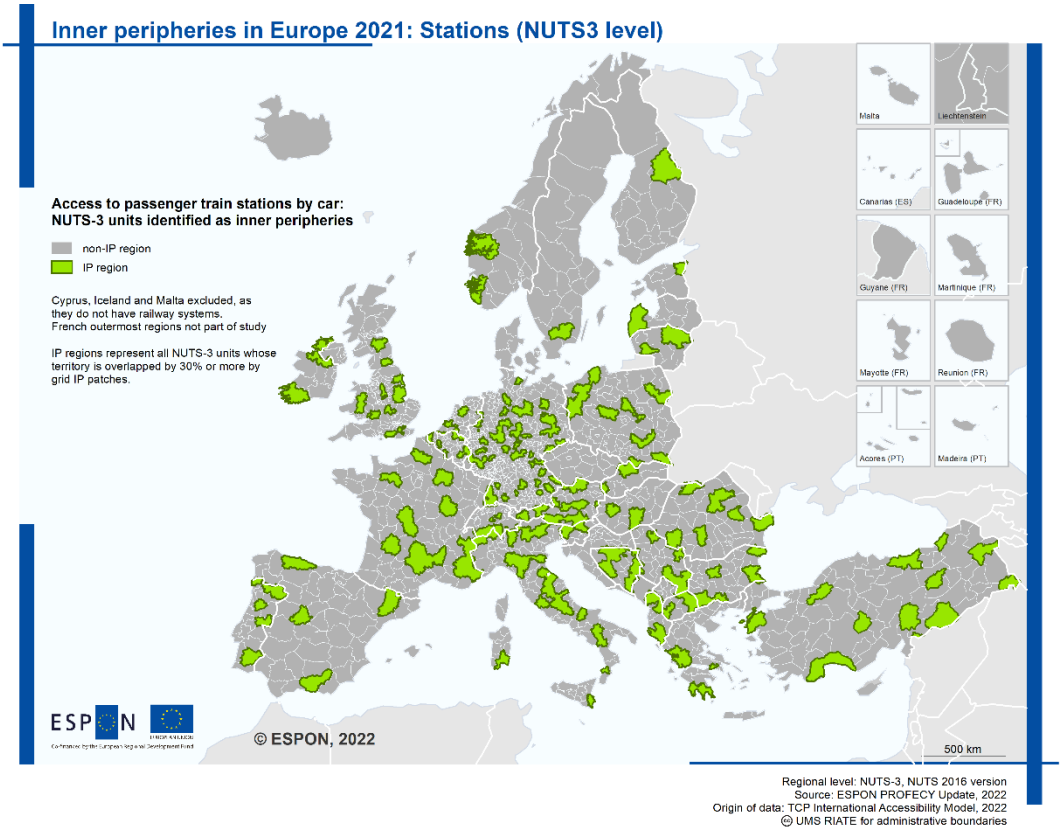


Figure 2-102. Access to train stations 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version).

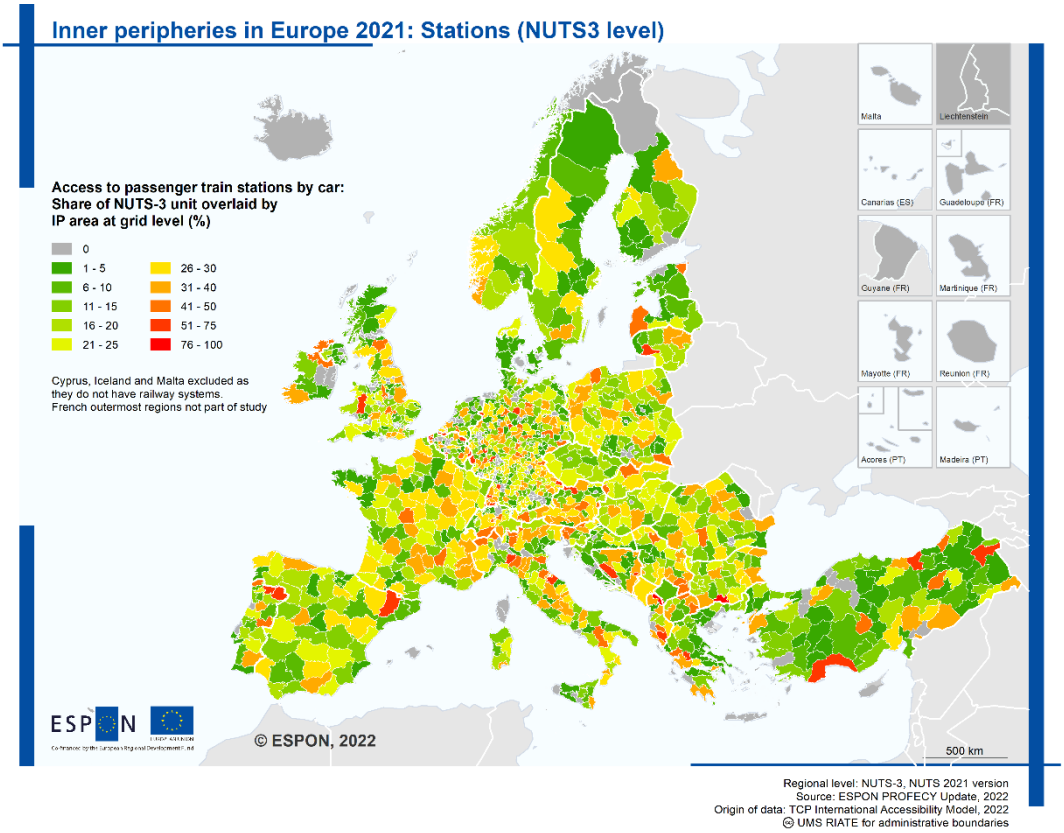


Figure 2-103. Access to train stations 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version).

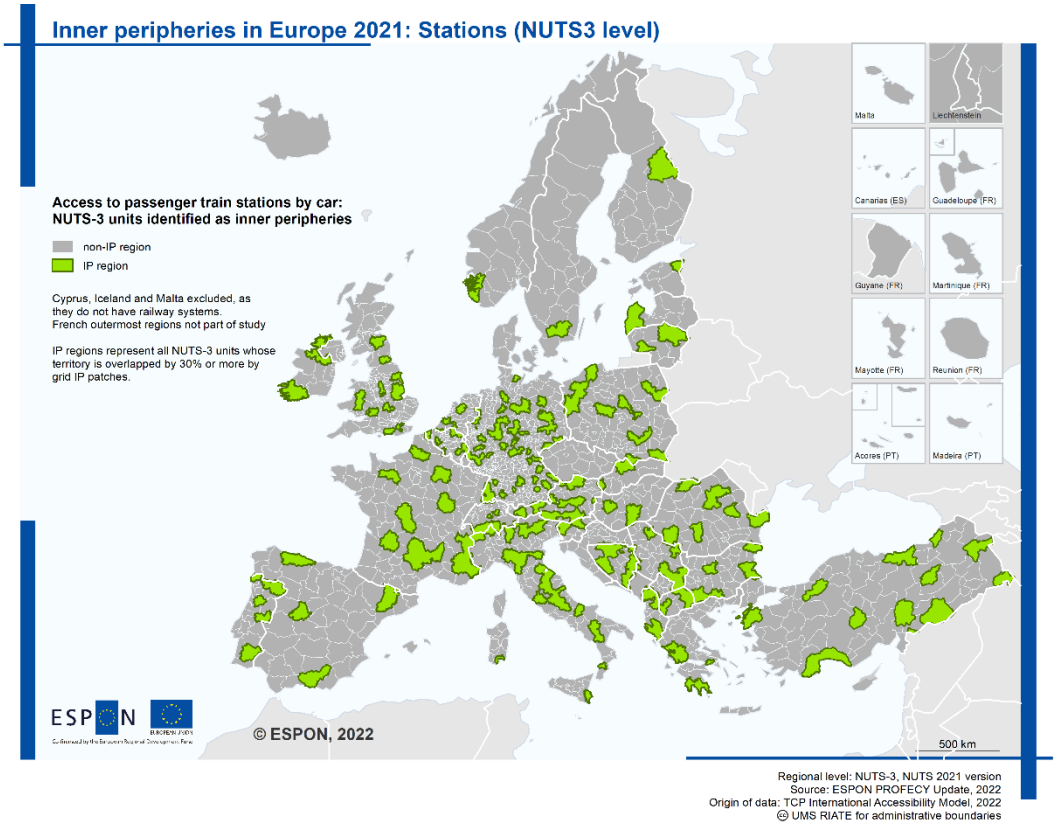


Figure 2-104. Availability of train stations within 20 minutes car travel time.

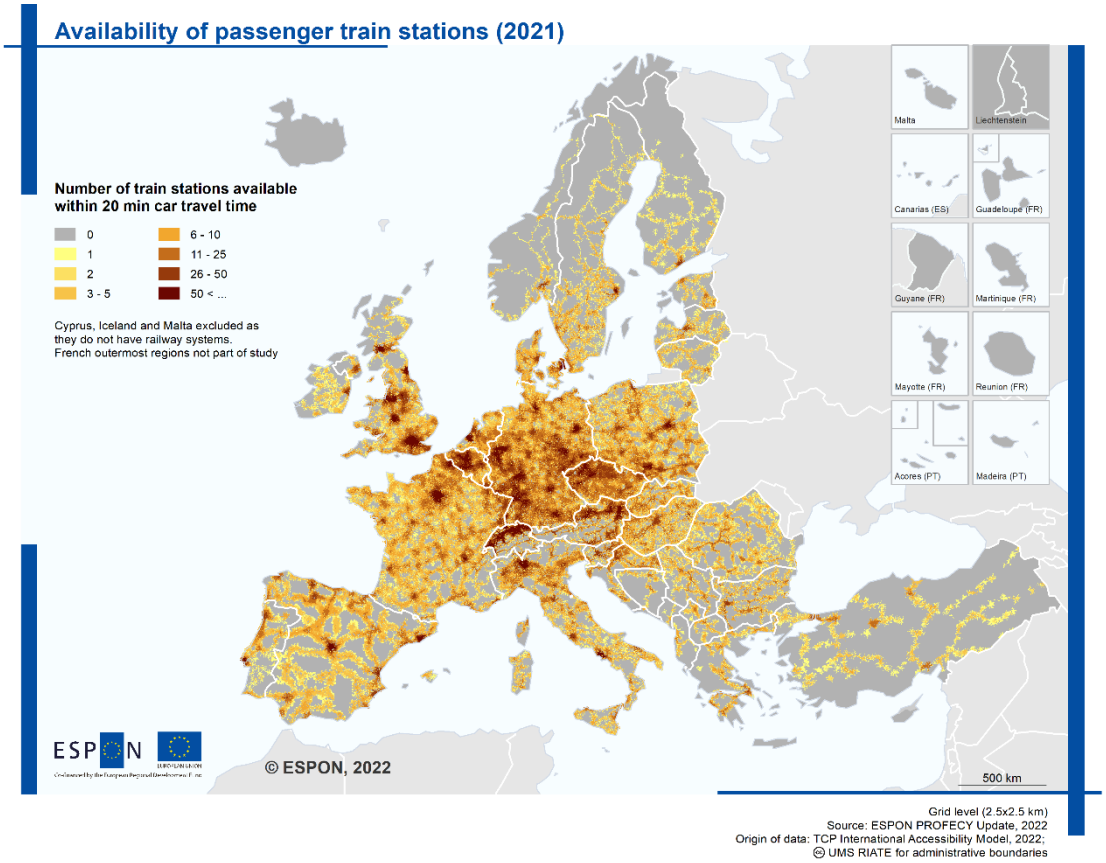
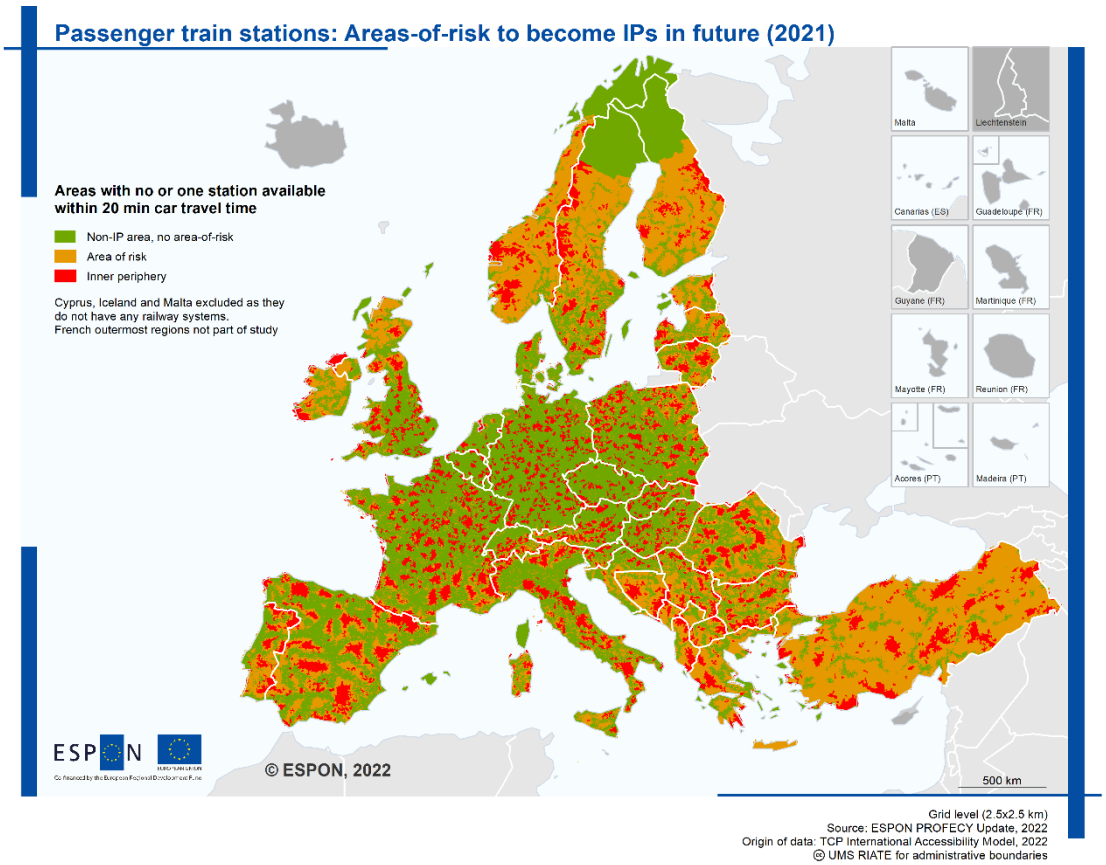


Figure 2-105. Passenger train stations: Areas of risk to become IP in future.



2.6 Retail sector

Supermarkets and convenient stores have been identified as relevant infrastructure to represent the retail sector. However, they have not been treated as separate services, rather they were treated as one service type, reflecting the different characteristics of the retail sector in the different countries.

The following maps have been generated as part of the delineation process:

- Shops in Europe
- Density of shops in Europe (2021) (2016 NUTS version)
- Density of shops in Europe (2021) (2021 NUTS version)
- Access to shops 2021: Travel time by car
- Access to shops 2021: Standardized travel time by car
- Access to shops 2021: Delineation of inner peripheries at grid level
- Access to shops 2021: Overlay of LAU units with IP areas at grid level
- Access to shops 2021: Identification of LAU units as inner peripheries
- Access to shops 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 version)
- Access to shops 2021: Identification of NUTS-3 regions as inner peripheries (2016 version)
- Access to shops 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 version)
- Access to shops 2021: Identification of NUTS-3 regions as inner peripheries (2021 version)
- Availability of shops within 15 minutes car travel time
- Shops: Areas of risk to become IP in future
- Number of shops that no longer can be reached within 15 minutes car travel time
- Percentage of shops that no longer can be reached within 15 minutes car travel time

Figure 2-106. Shops in Europe.

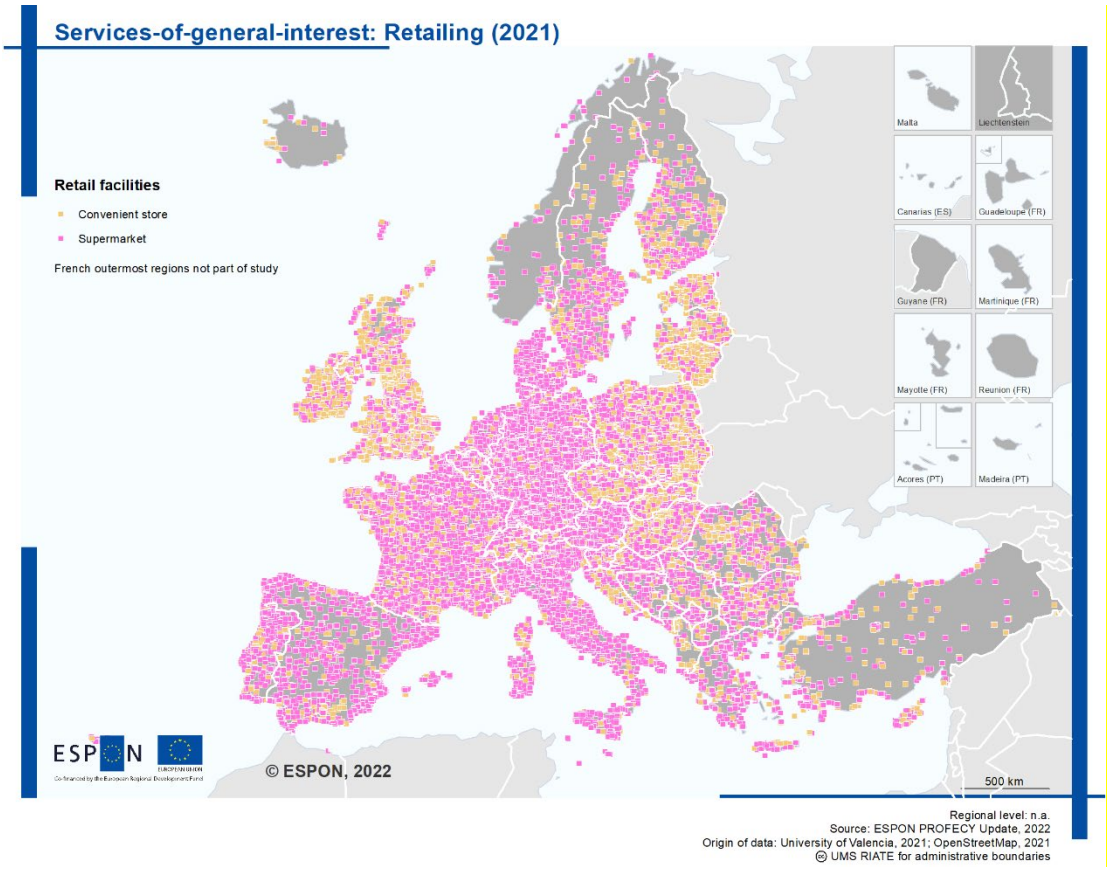


Figure 2-107. Density of Shops in Europe (2021) (2016 NUTS version).

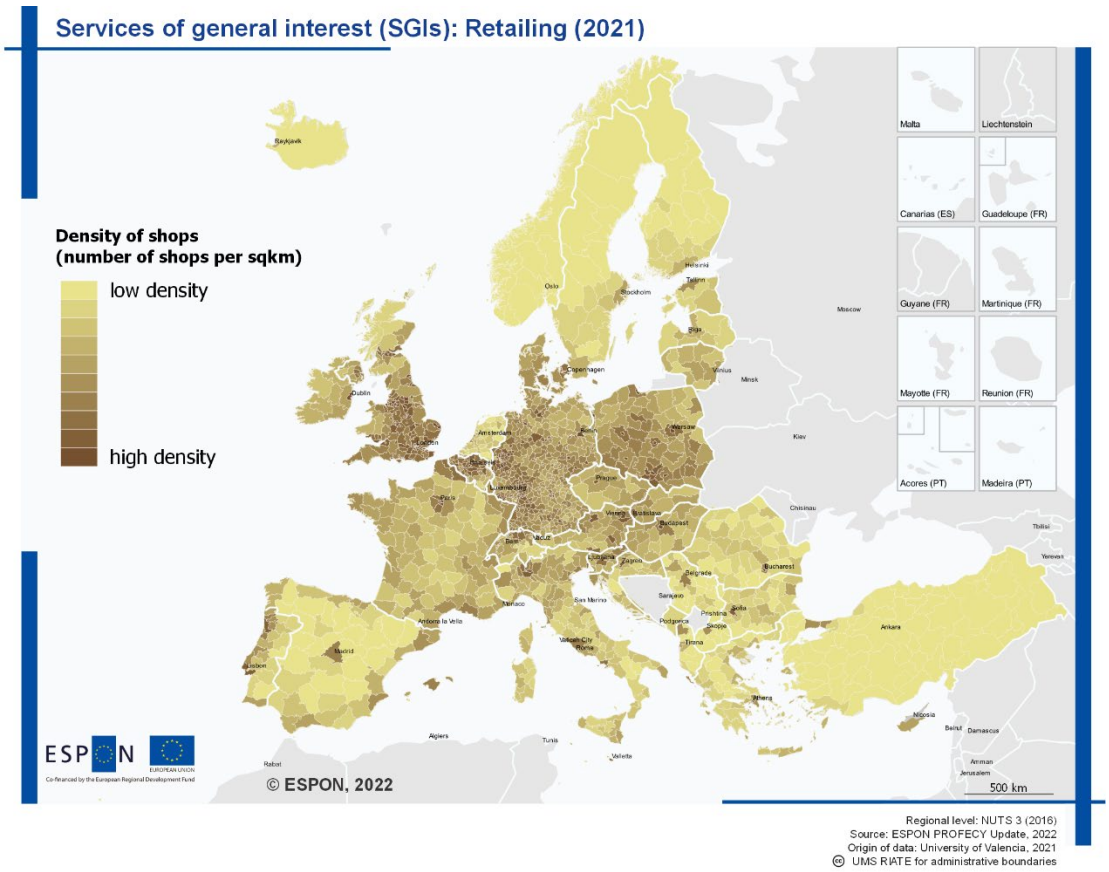


Figure 2-108. Density of Shops in Europe (2021) (2021 NUTS version).

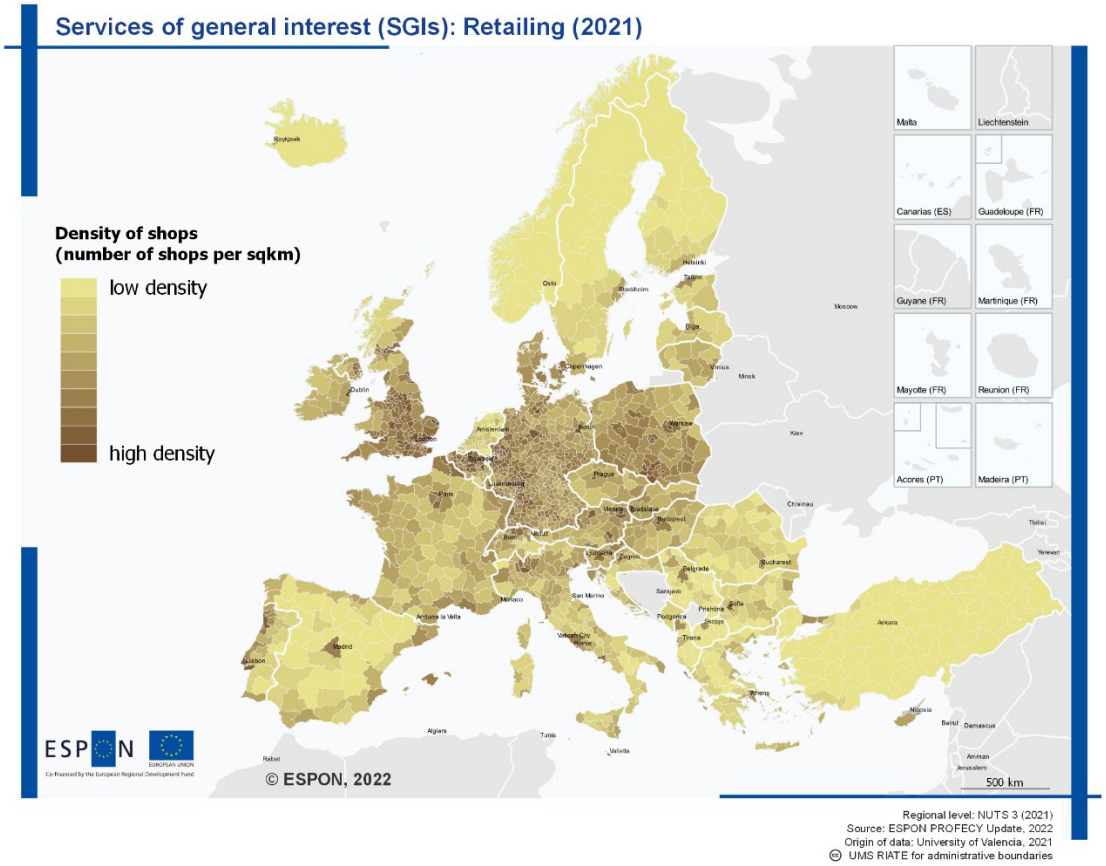


Figure 2-109. Access to shops 2021: travel time by car.

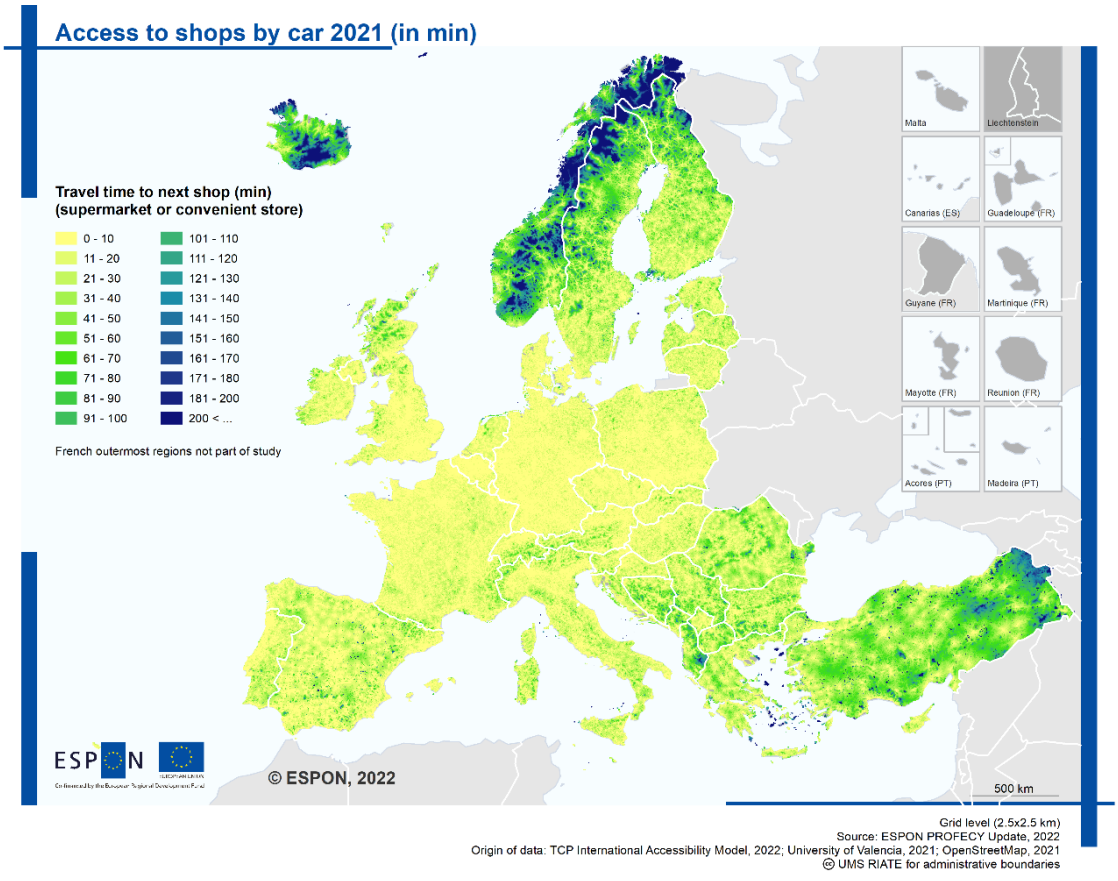
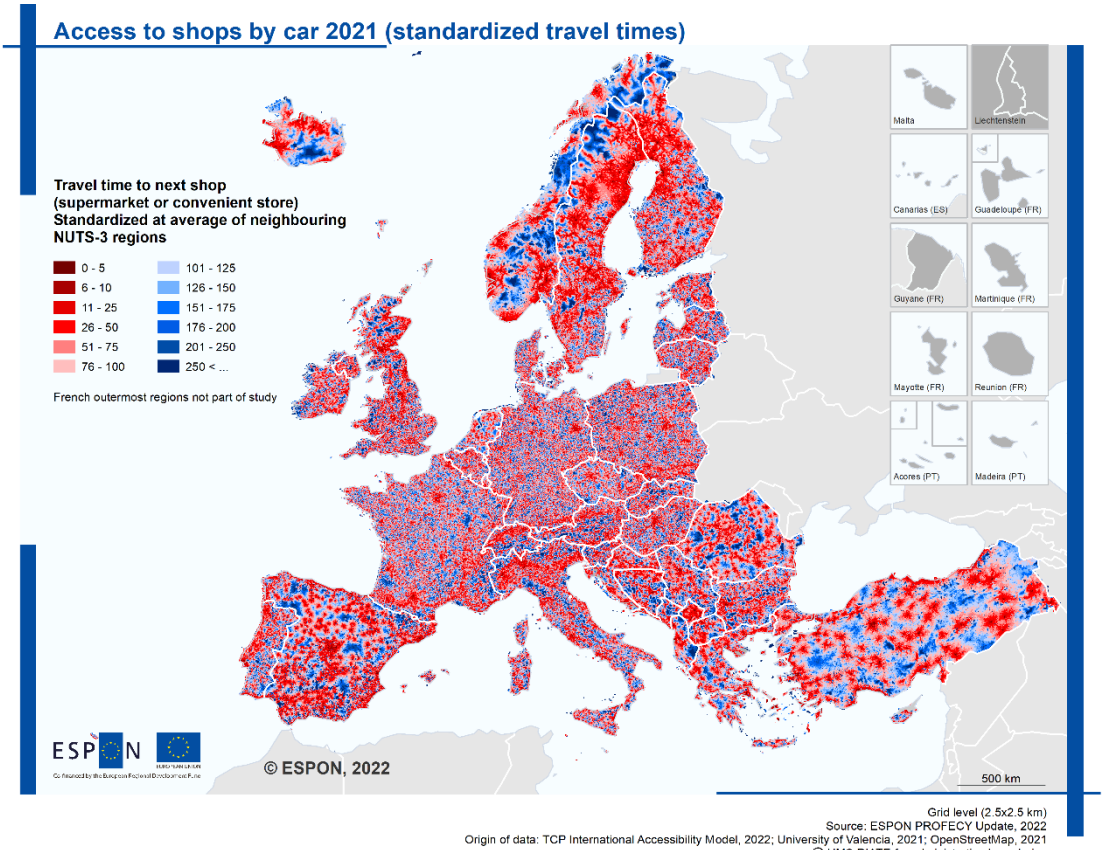


Figure 2-110. Access to shops 2021: Standardized travel time by car.



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
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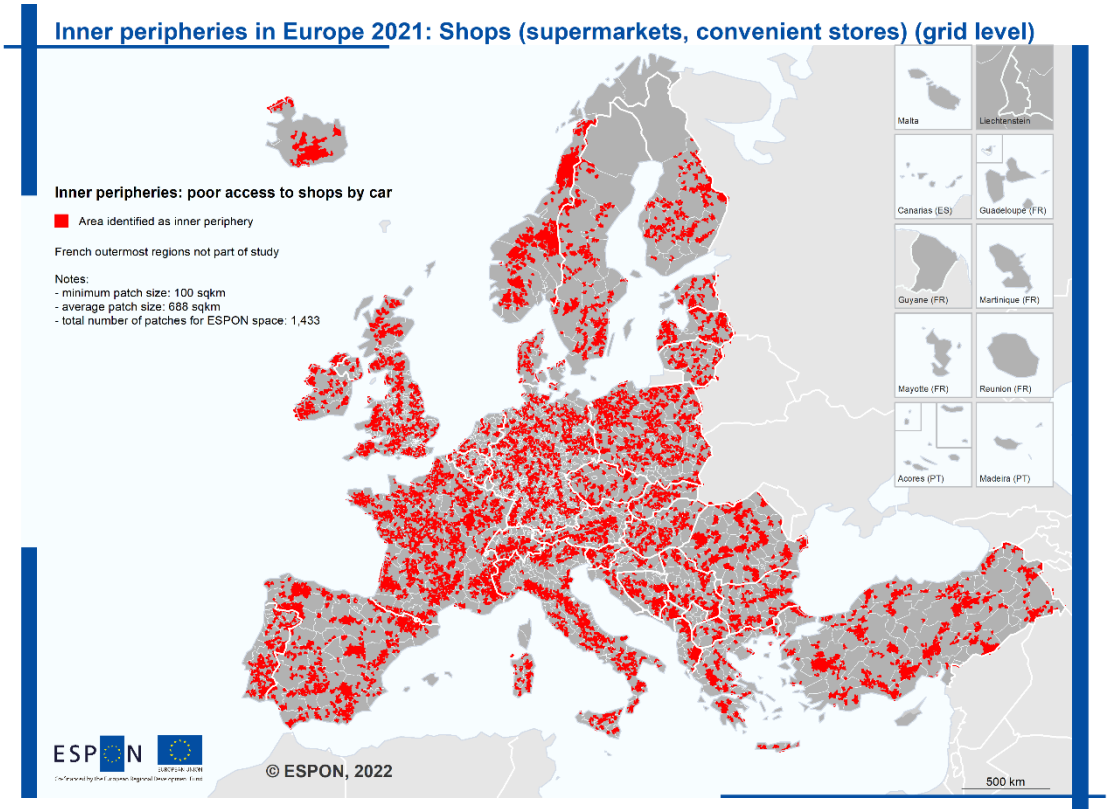
Figure 2-111. Access to shops 2021: Inner peripheries (grid level).



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
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Figure 2-112. Access to shops 2021: Overlay of LAU units with IP areas at grid level.

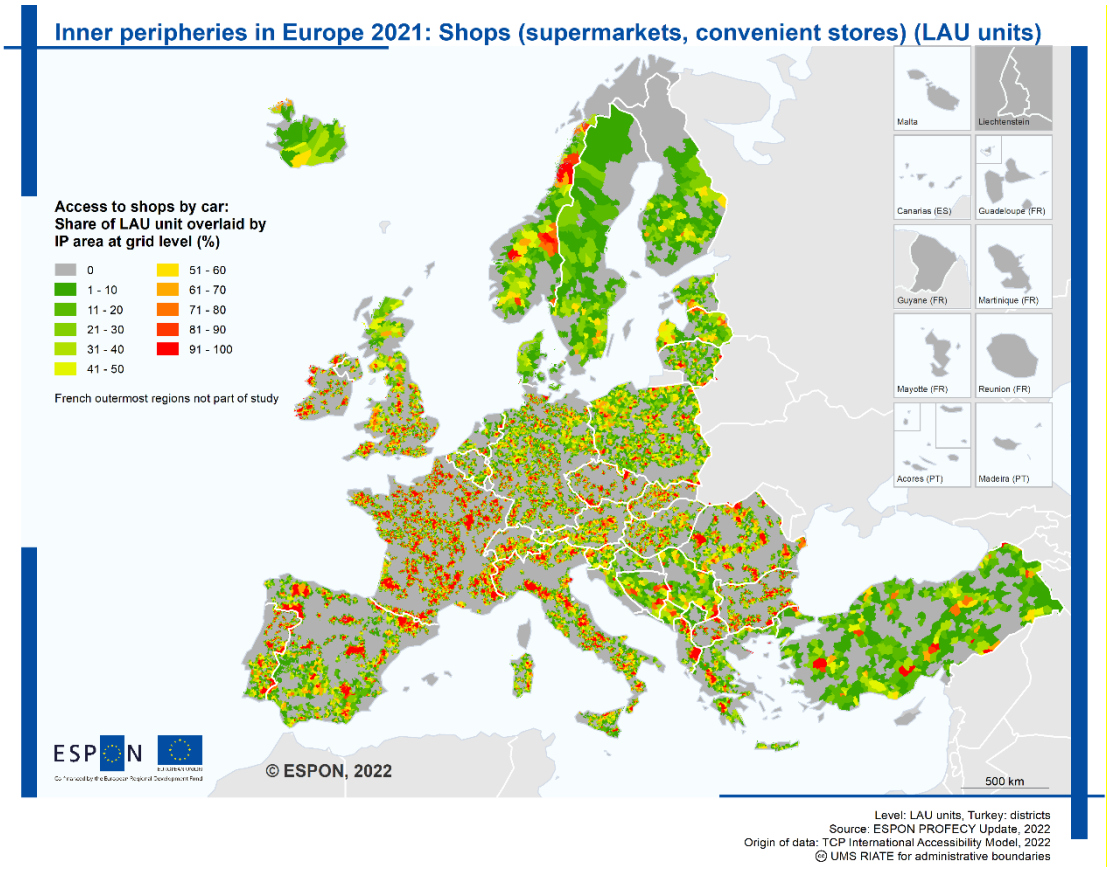


Figure 2-113. Access to shops 2021: Identification of LAU units as inner peripheries.

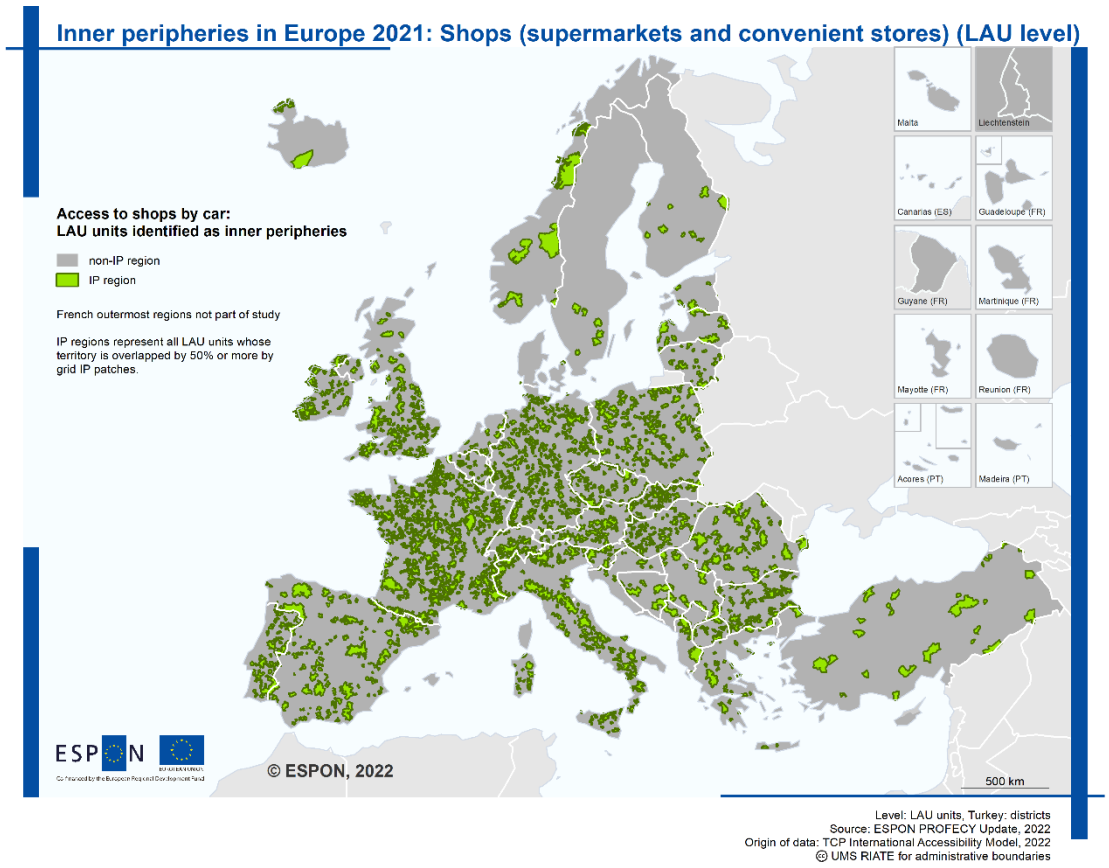


Figure 2-114. Access to shops 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version).

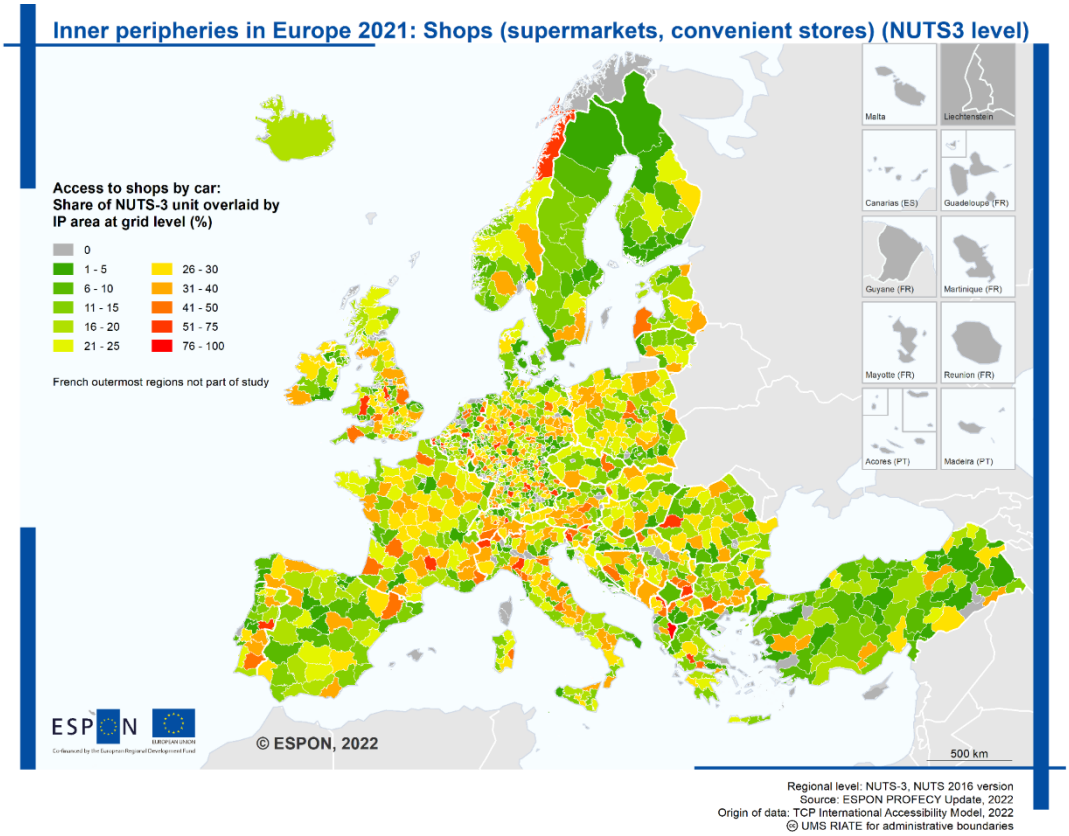


Figure 2-115. Access to shops 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version).

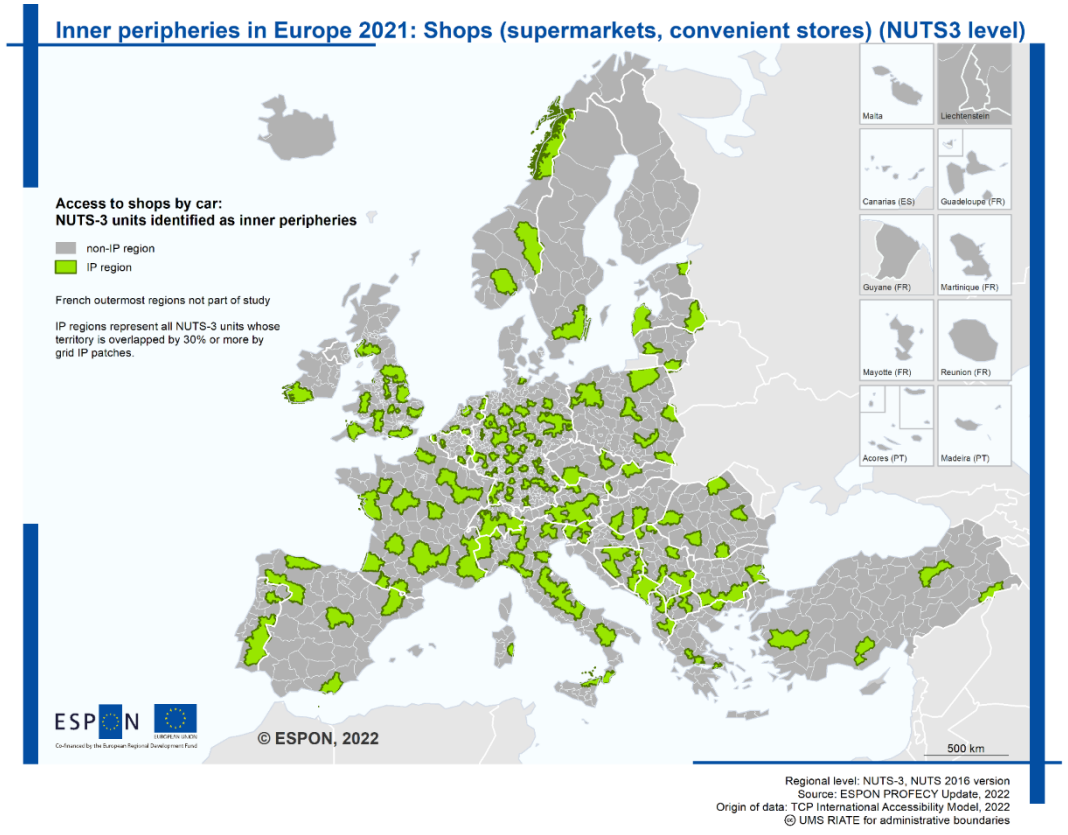


Figure 2-116. Access to shops 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version).

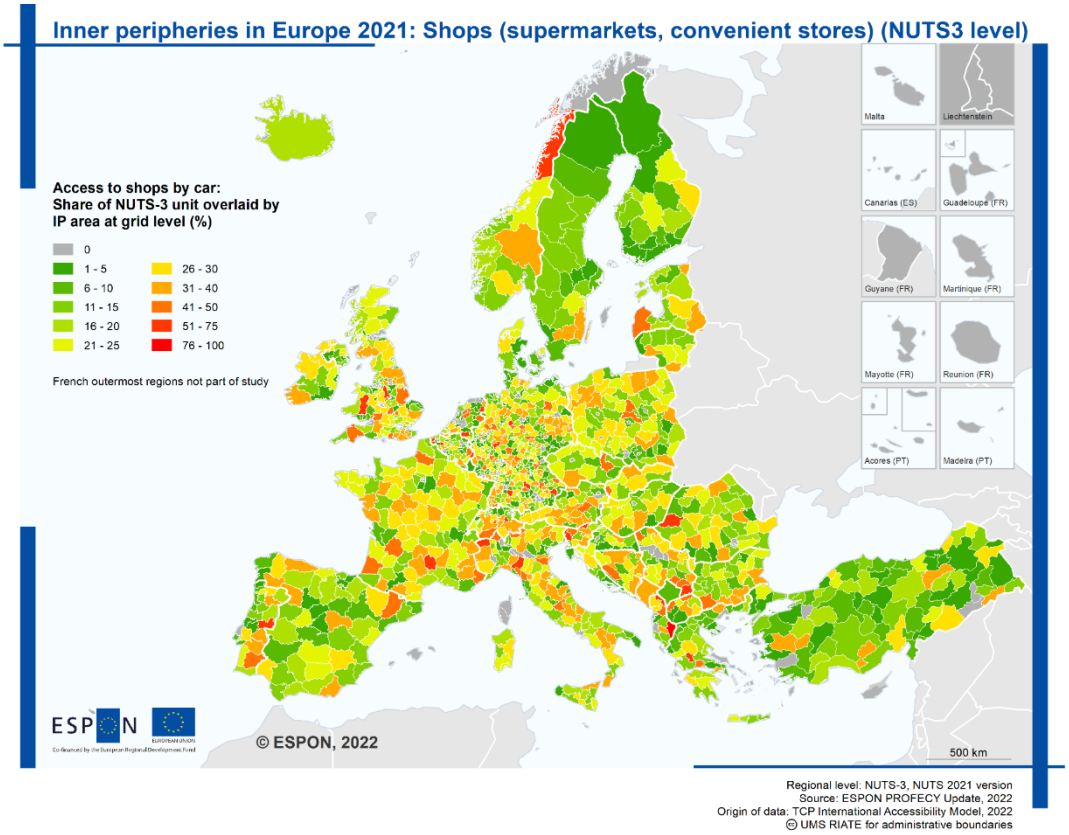


Figure 2-117. Access to shops 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version).

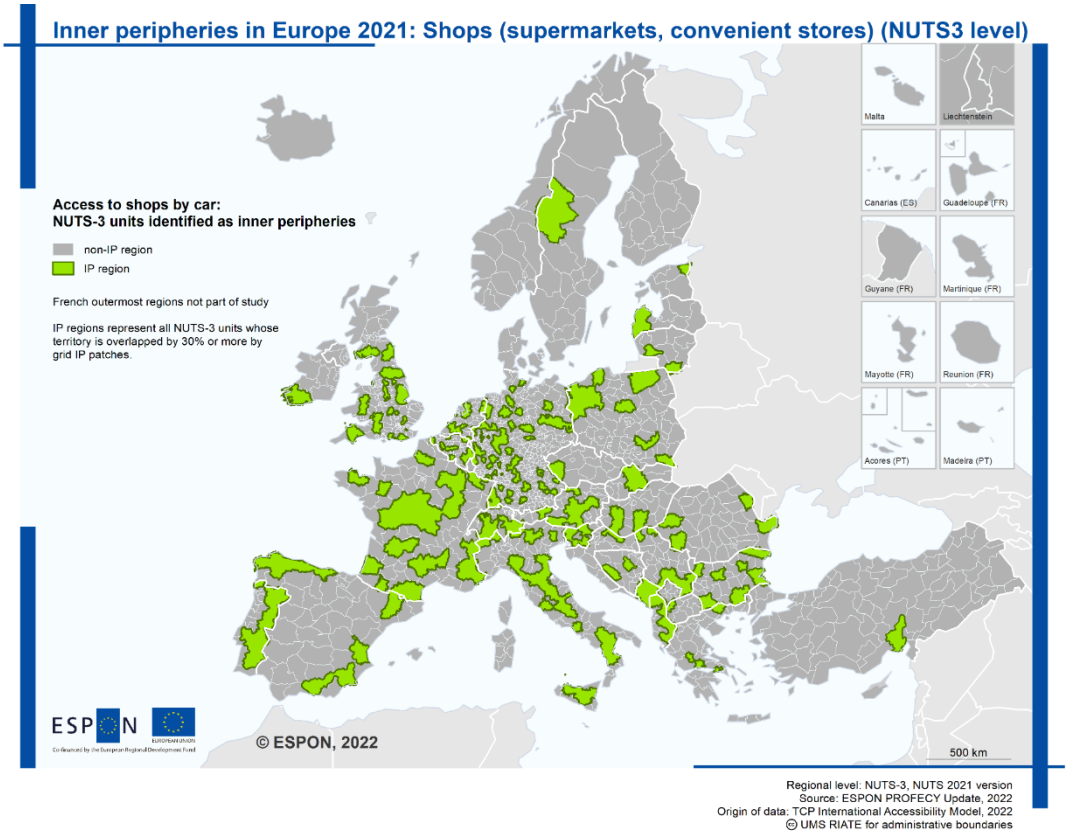


Figure 2-118. Availability of shops within 15 minutes car travel time.

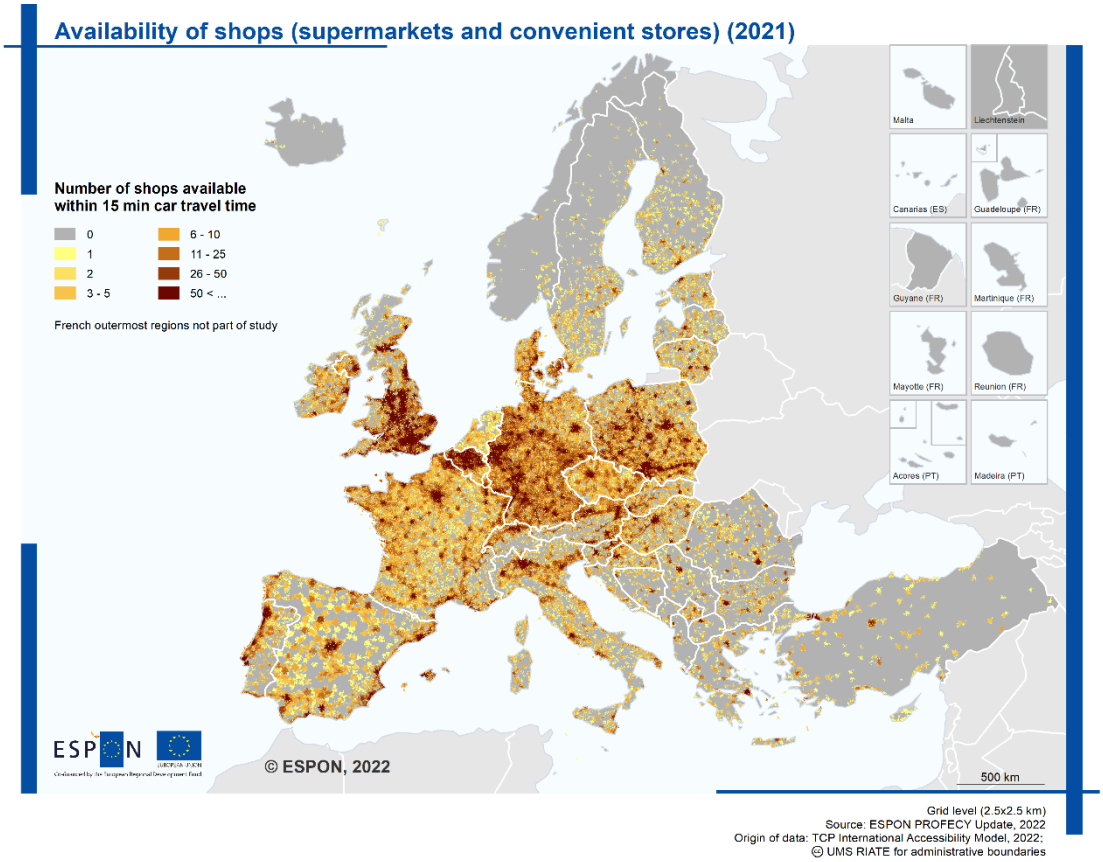
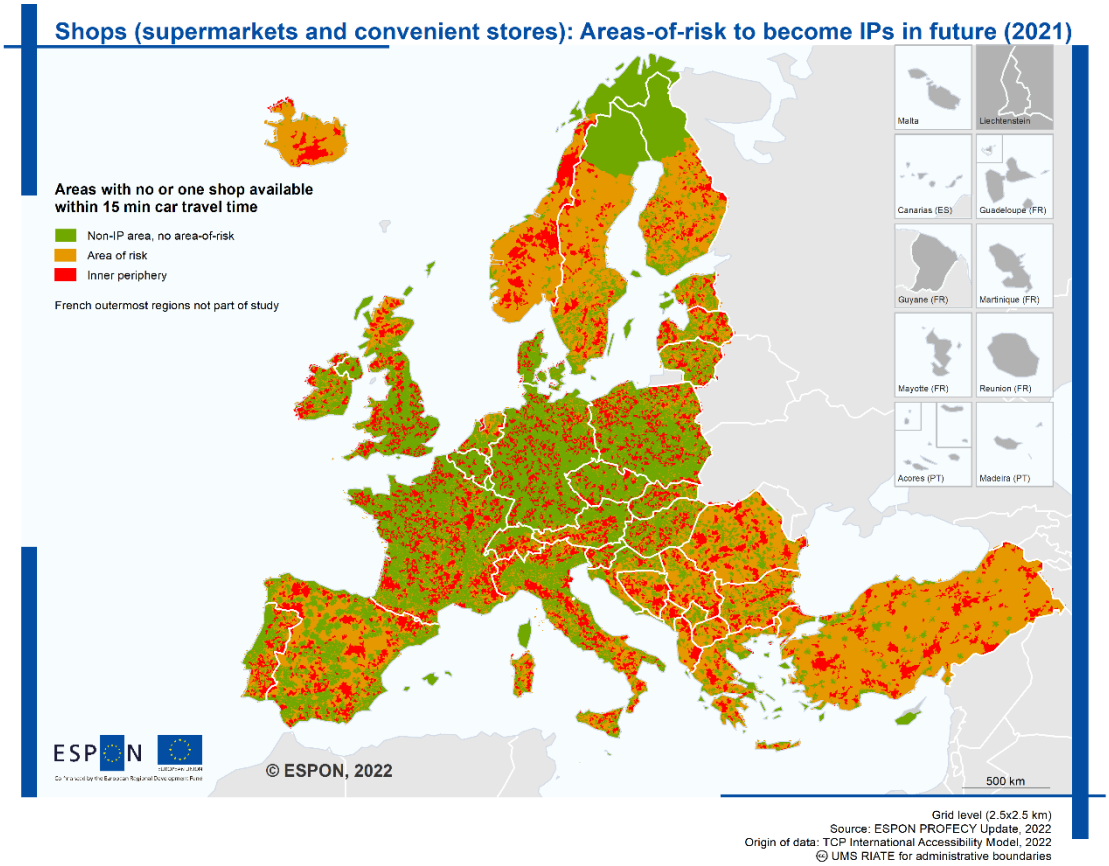


Figure 2-119. Shops: Areas of risk to become IP in future.



2.7 Jobs

Since a European-wide job register with address information is not available, it was assumed that most of the jobs in Europe are located in urban settlements. The settlements are represented in so-called “urban morphological zones” (UMZ). Access to jobs was thus modelled in this study as the access to the UMZ.

The following maps have been generated as part of the delineation process:

- Jobs (UMZ) in Europe
- Access to jobs 2021: Travel time by car
- Access to jobs 2021: Standardized travel time by car
- Access to jobs 2021: Delineation of inner peripheries at grid level
- Access to jobs 2021: Overlay of LAU units with IP areas at grid level
- Access to jobs 2021: Identification of LAU units as inner peripheries
- Access to jobs 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 version)
- Access to jobs 2021: Identification of NUTS-3 regions as inner peripheries (2016 version)
- Access to jobs 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 version)
- Access to jobs 2021: Identification of NUTS-3 regions as inner peripheries (2021 version)

Figure 2-120. Jobs (UMZ) in Europe.

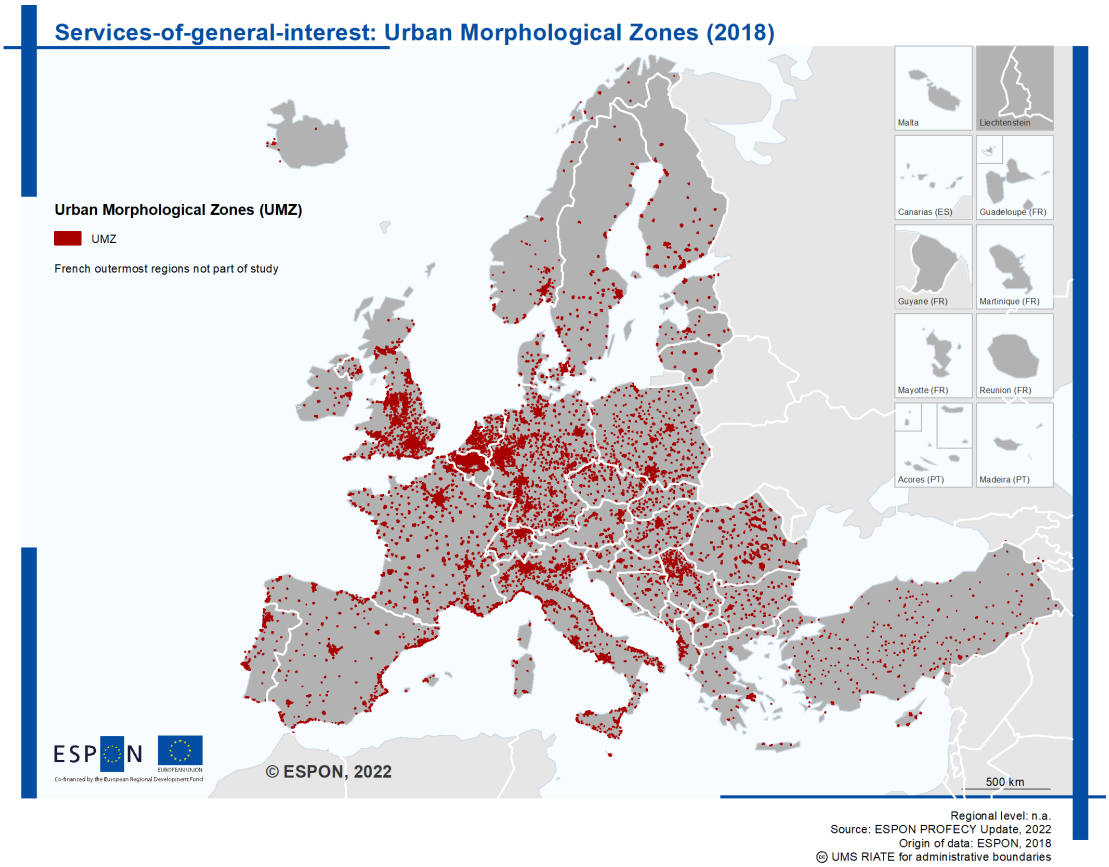


Figure 2-121. Access to jobs 2021: travel time by car.

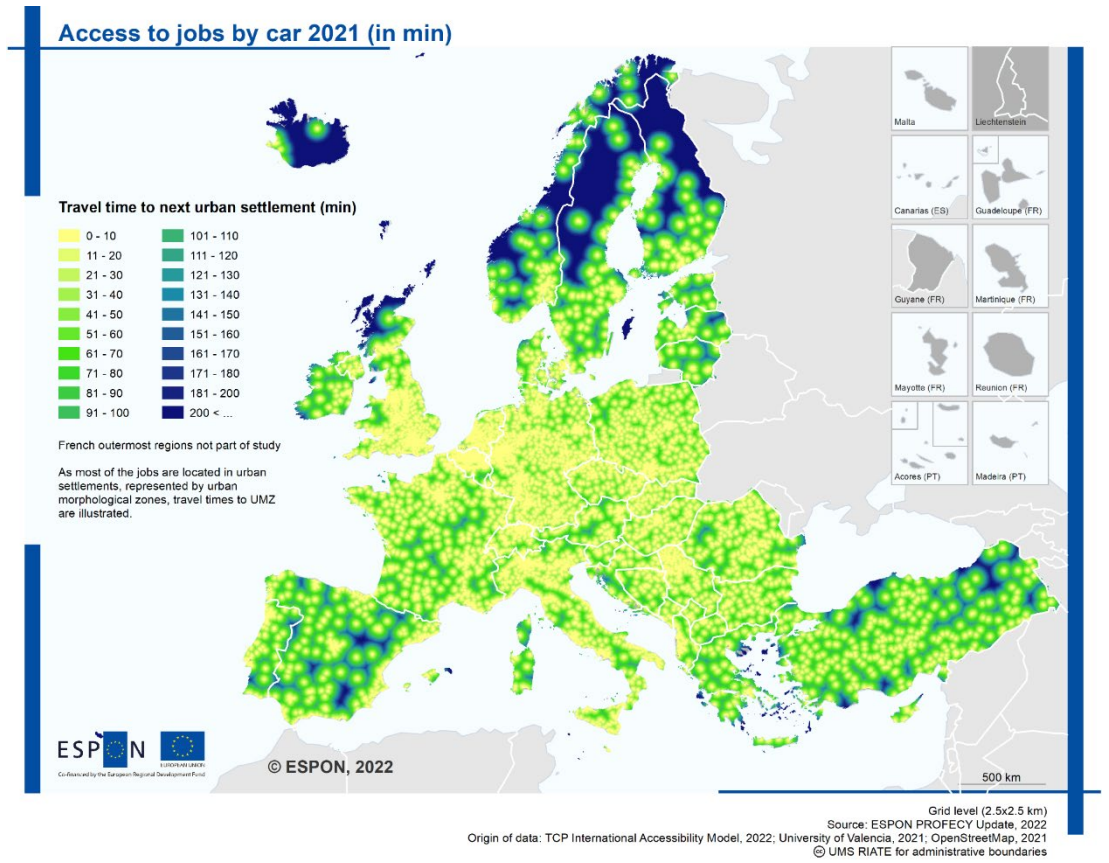
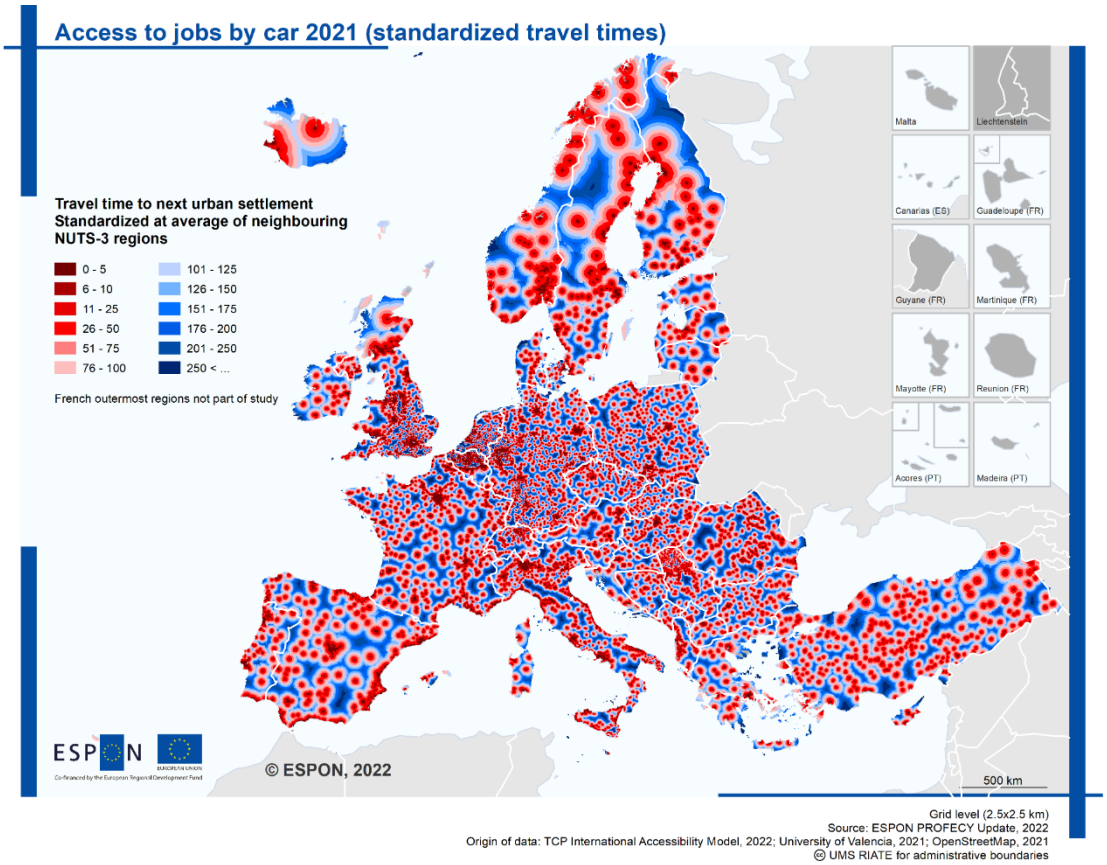


Figure 2-122. Access to jobs 2021: travel time by car.



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
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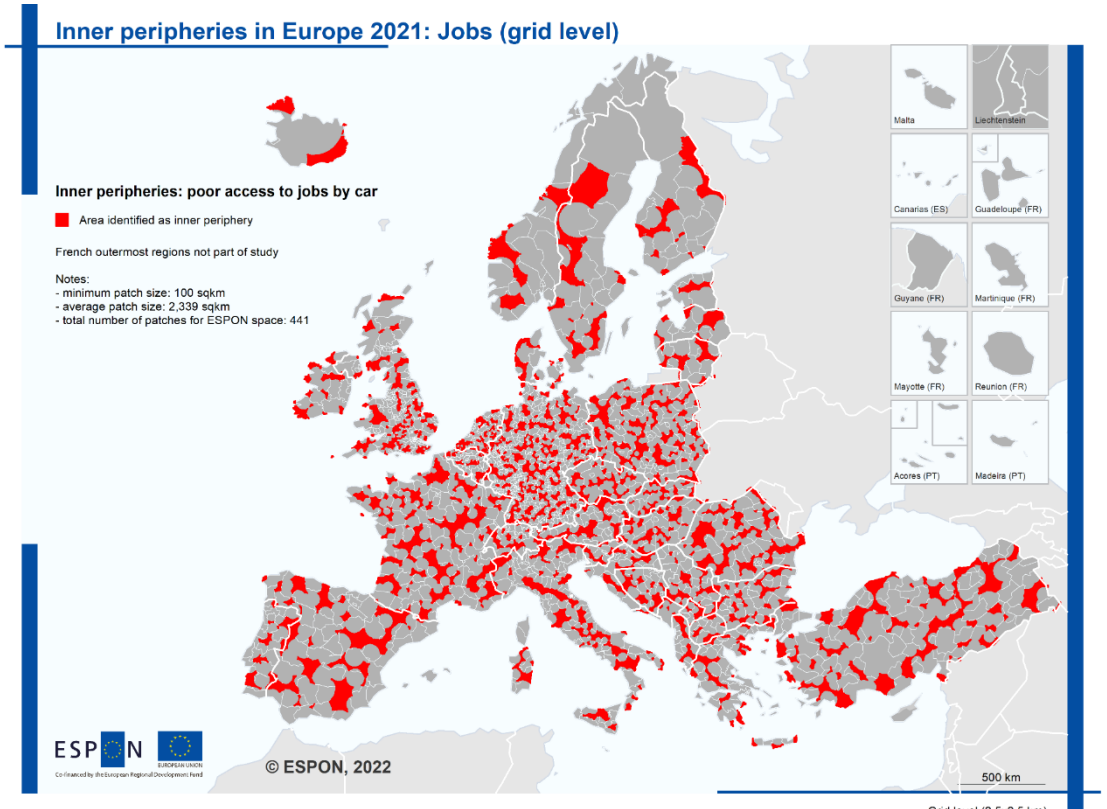
Figure 2-123. Access to jobs 2021: Inner peripheries (grid level).



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
© UMS RIATE for administrative boundaries

Figure 2-124. Access to jobs 2021: Overlay of LAU units with IP areas at grid level.

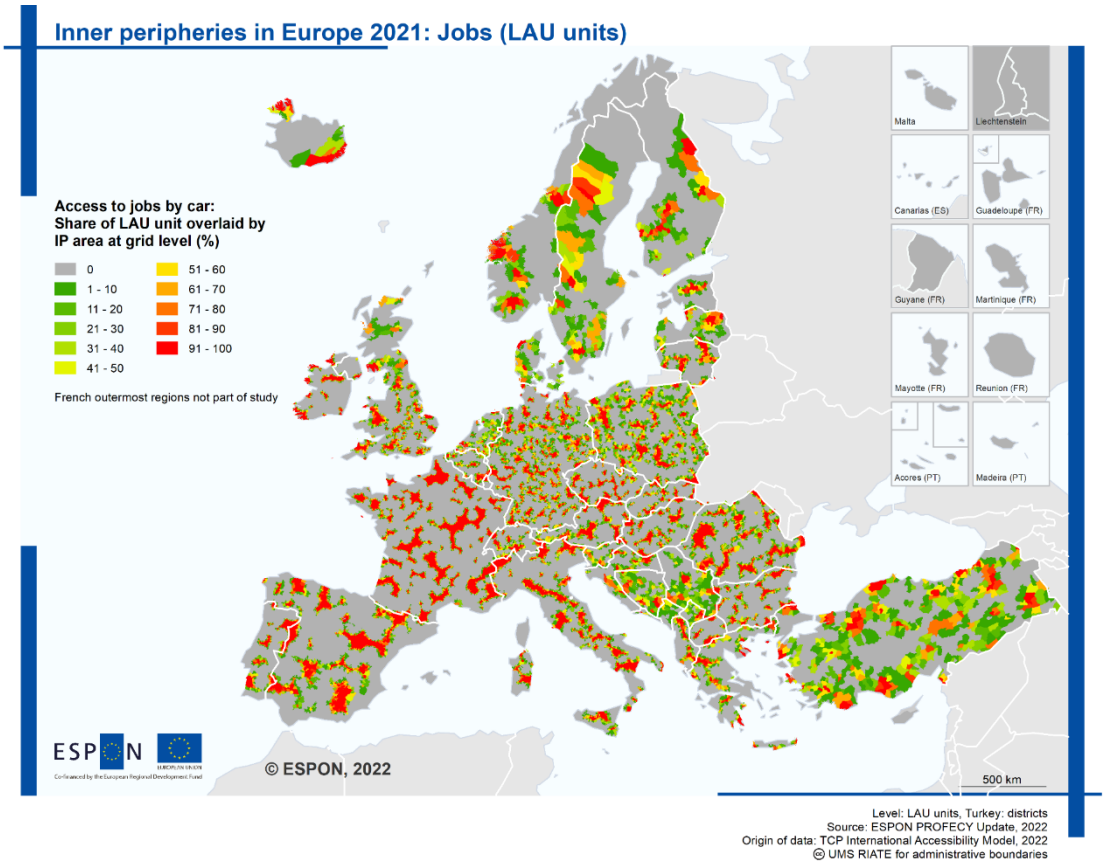


Figure 2-125. Access to jobs 2021: Identification of LAU units as inner peripheries.

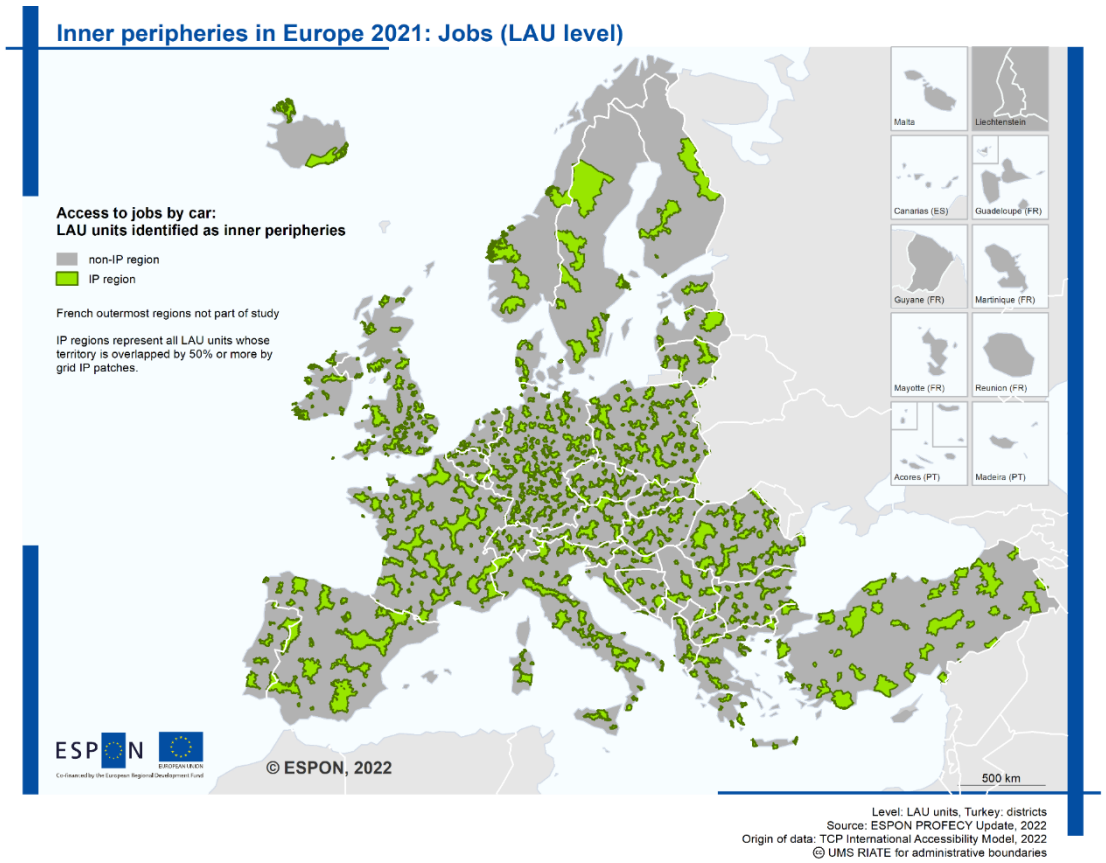


Figure 2-126. Access to jobs 2021: Overlay of NUTS-3 regions with IP areas at grid level (2016 NUTS version).

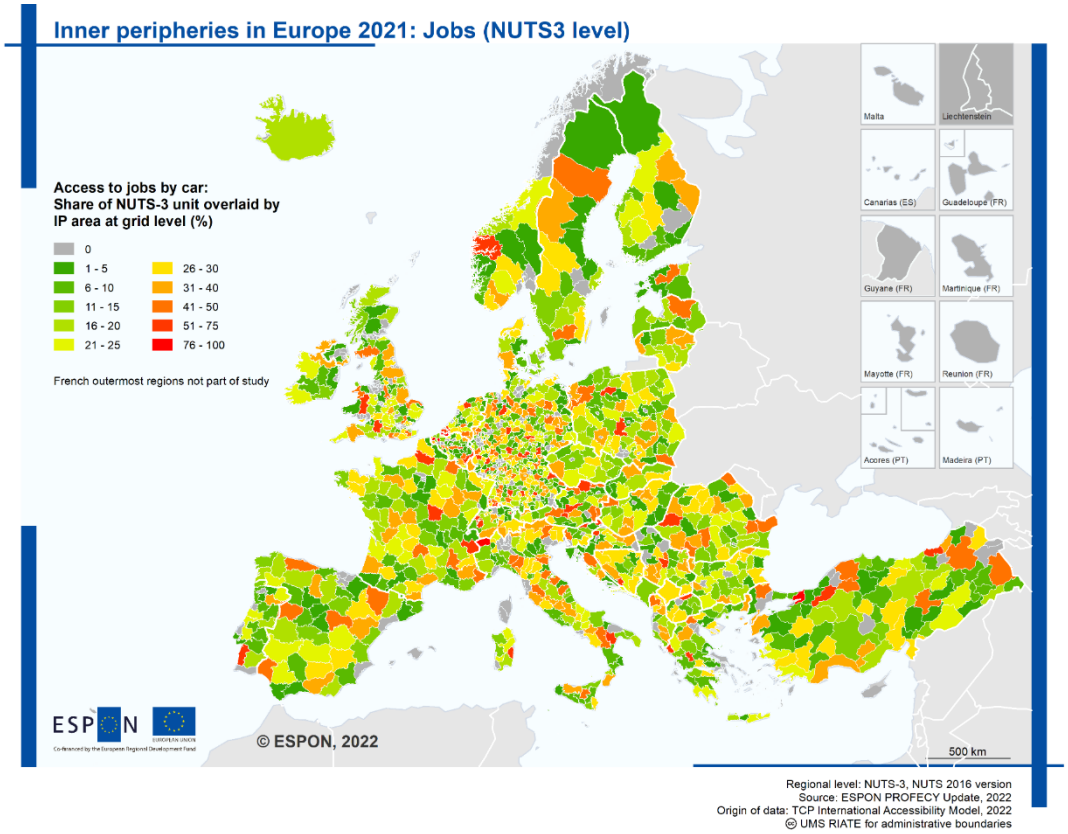


Figure 2-127. Access to jobs 2021: Identification of NUTS-3 regions as inner peripheries (2016 NUTS version).

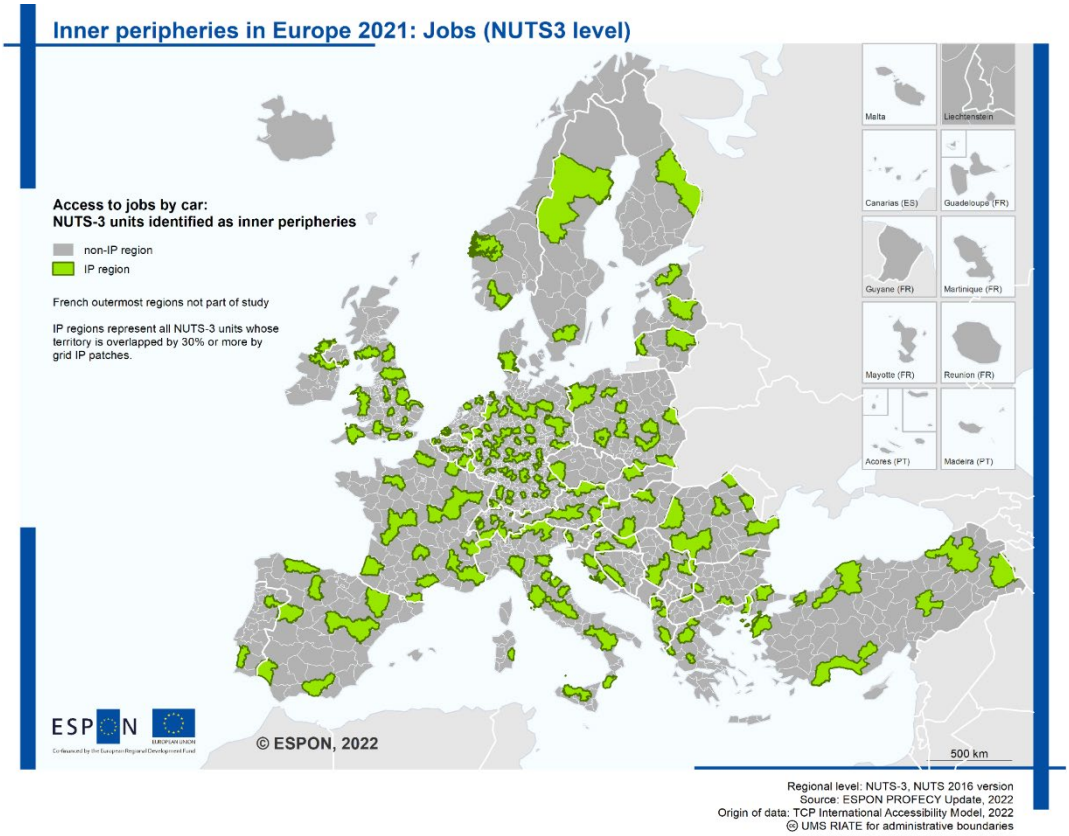


Figure 2-128. Access to jobs 2021: Overlay of NUTS-3 regions with IP areas at grid level (2021 NUTS version).

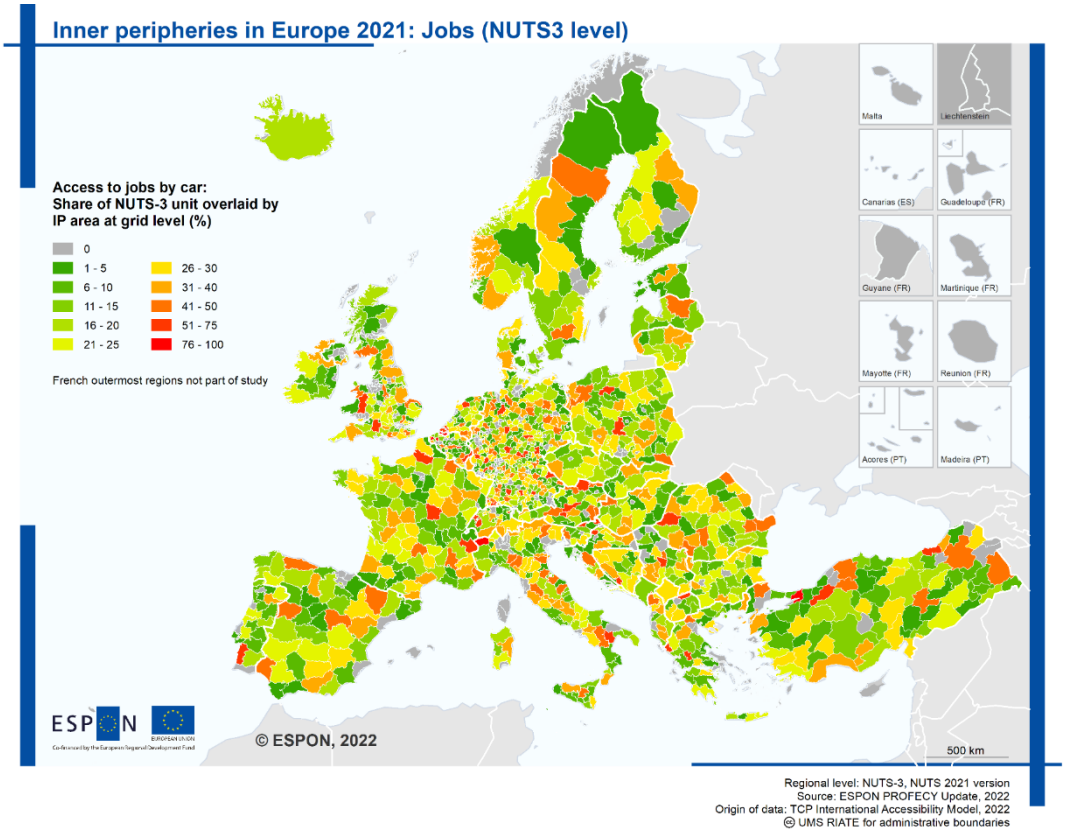
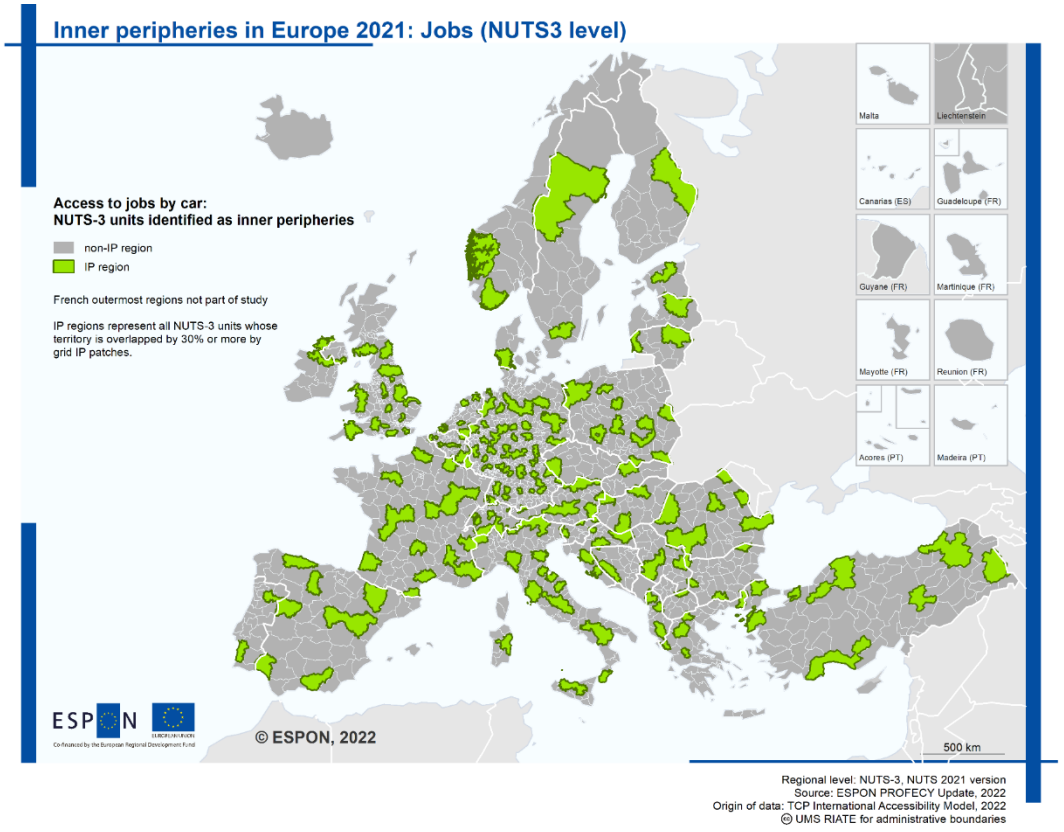


Figure 2-129. Access to jobs 2021: Identification of NUTS-3 regions as inner peripheries (2021 NUTS version).



3 Combining individual results

3.1 Individual results

The map series presented in Chapter 2 show many areas appearing as inner peripheries for several types of service; however, a detailed view reveals that the shape of the patch boundaries differ between the services, so as their total numbers and average sizes (Table 3-1). There is a tendency that with increasing number of facilities per service the number of IP patches will also increase, while at the same time the average patch size decreases. In other words, the higher the number of facilities per service, the higher the degree of fragmentation of IP areas will be (more but smaller IP patches).

Table 3-1. Characteristics of IP patches at grid level by type of service.

Service type	Number of facilities in ESPON space	Number of IP patches	Total area (km²)	Average size of IP patch (km²)
Banks	116,251	1,501	970,522	647
Cinemas	8,385	1,050	710,703	677
Doctors	68,959	1,104	837,094	758
Hospitals	11,691	1,165	813,109	698
Pharmacies	125,796	1,484	1,027,100	692
Retail sector	92,853	1,433	985,863	688
Primary schools	169,672	1,537	1,102,472	717
Secondary schools	50,033	1,352	918,484	679
Train stations	35,225	1,135	917,459	808
UMZ (jobs)	5,078	441	1,031,316	2,339

While the detailed individual results of the previous analyses represent a value in themselves, attempts shall be made to aggregate or combine them into one final and overall delineation, which is presented in following Chapter 3.2.

3.2 Areas identified as Inner Peripheries

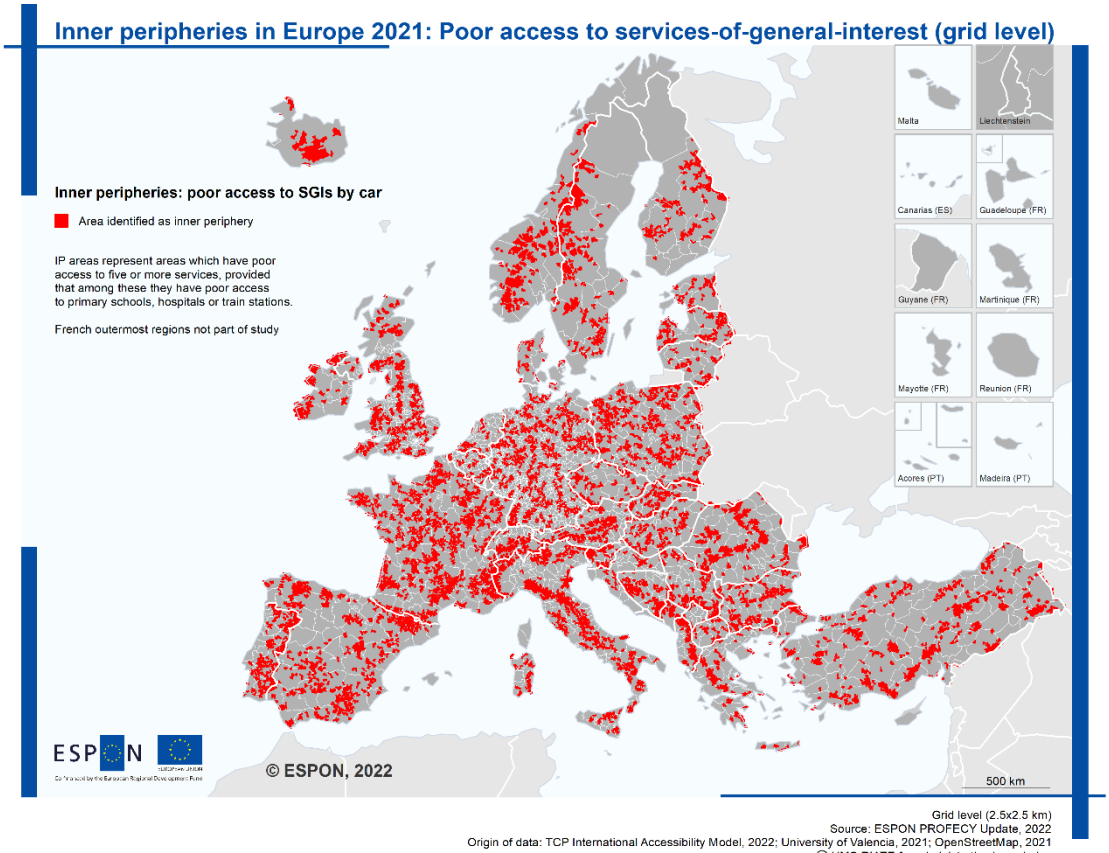
While the individual results for each service presented in Chapter 2 are interesting and valuable in themselves, PROFECY has also developed a procedure for combining the individual results into one overall assessment of inner peripheries.

After some tests, an “counting and weighting” approach had been selected according to which combined inner peripheries are “all areas which have poor access to five or more services (whatever the type of service) upon the condition that they suffer from poor access to hospitals (=health care), poor access to primary schools (=education) or poor access to train stations (=provision of public transport). Figure 3-1 to Figure 3-4 illustrate the delineated inner peripheries for the different spatial scales.

However, poor access to services has been identified in PROFECY only as one important driver for inner peripherality. Other drivers are poor economic potentials and poor socio-economic and demographic situations. Figure 3-5 identifies these drivers.

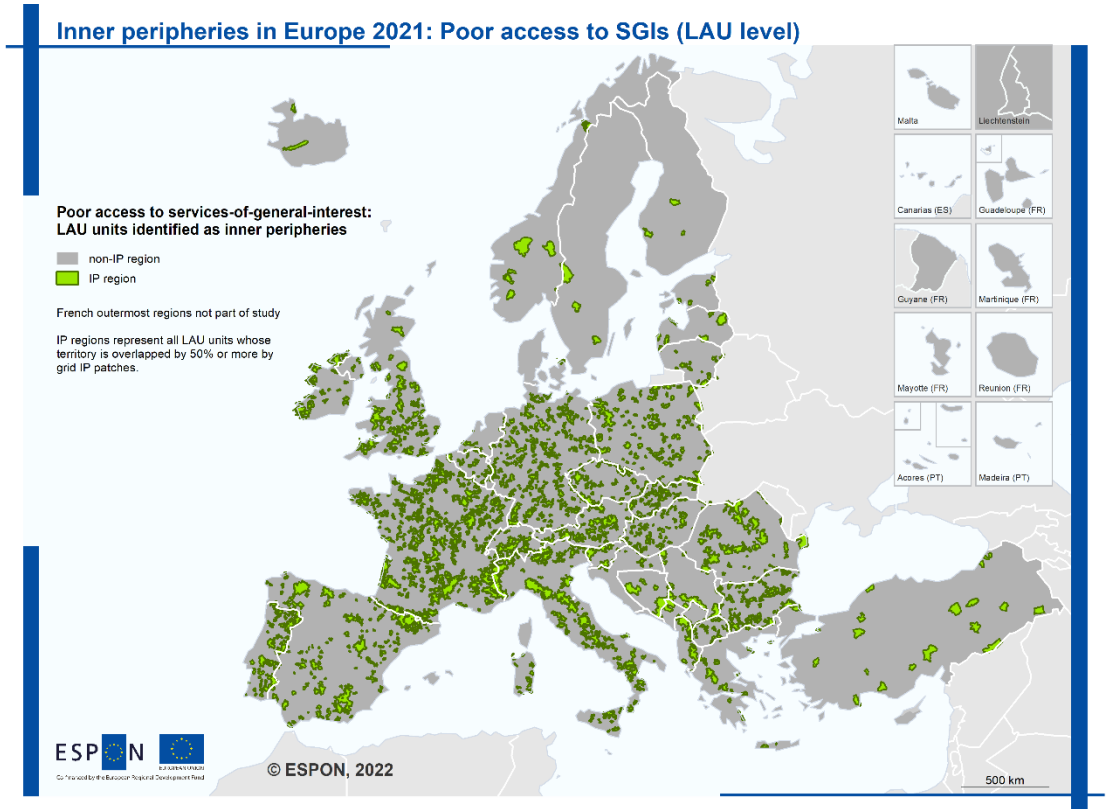
Finally, differences in the delineation of inner peripheries from 2017 towards 2021 and the transition from areas-of-risk in 2017 towards inner peripheries in 2021 have been illustrated as well.

Figure 3-1. Inner peripheries in Europe: Poor access to SGIs (grid level).



Grid level (2.5x2.5 km)
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022; University of Valencia, 2021; OpenStreetMap, 2021
(c) UMS RIATE for administrative boundaries

Figure 3-2. Inner peripheries in Europe: Poor access to SGIs (LAU level).



Level: LAU units, Turkey: districts
Source: ESPON PROFECY Update, 2022
Origin of data: TCP International Accessibility Model, 2022
(c) UMS RIATE for administrative boundaries

Figure 3-3. Inner peripheries in Europe: Poor access to SGIs (NUTS-3 level, 2016 version).

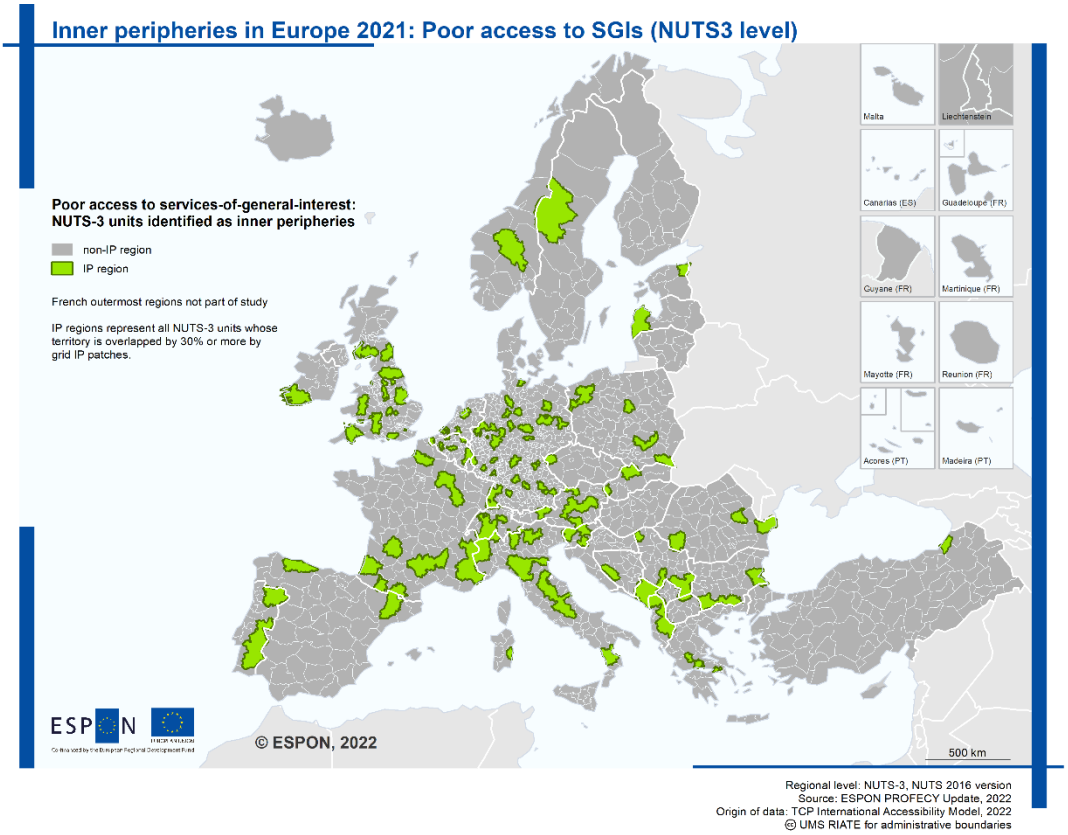


Figure 3-4. Inner peripheries in Europe: Poor access to SGIs (NUTS-3 level, 2021 version).

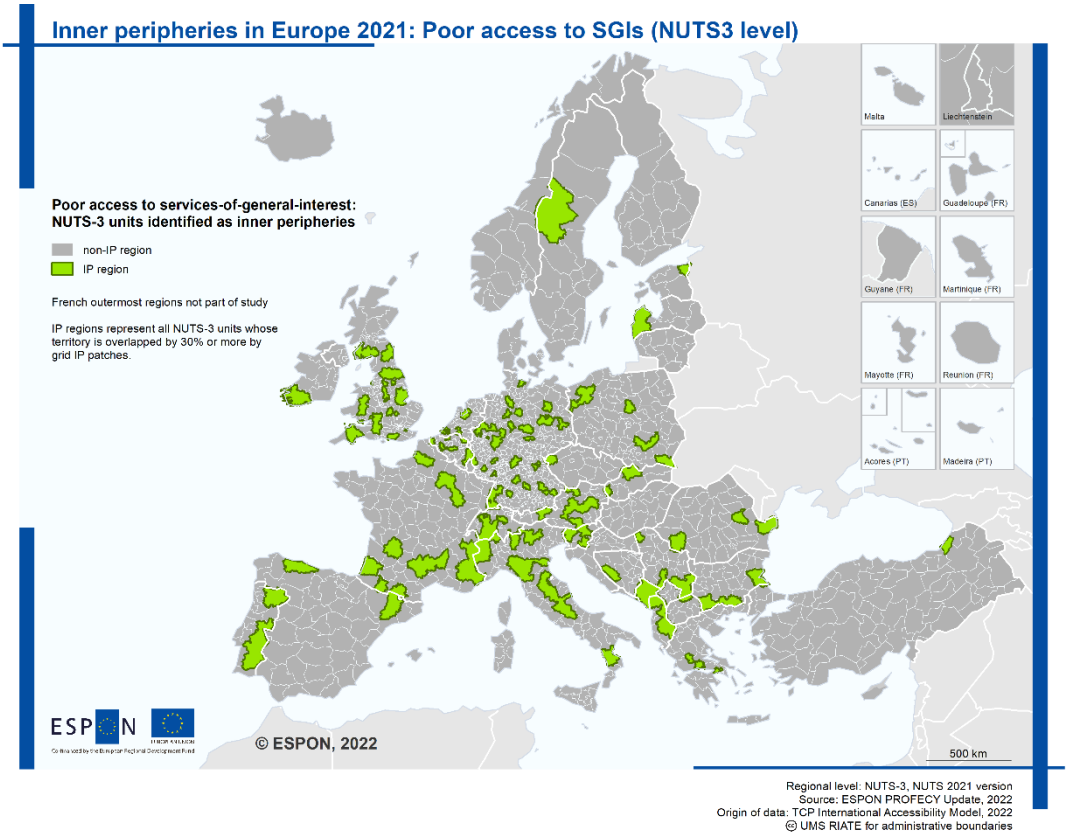


Figure 3-5. Main drivers of inner peripherality.

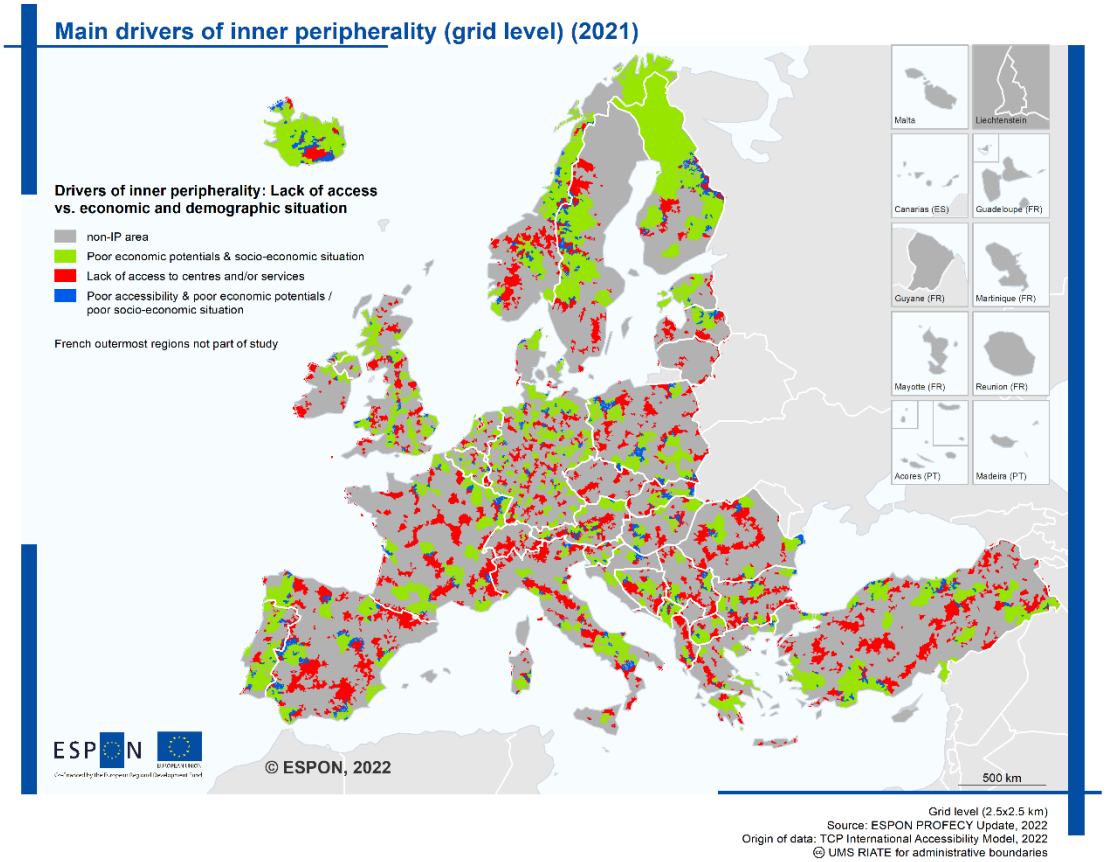


Figure 3-6. Areas under severe pressure to become IP in future.

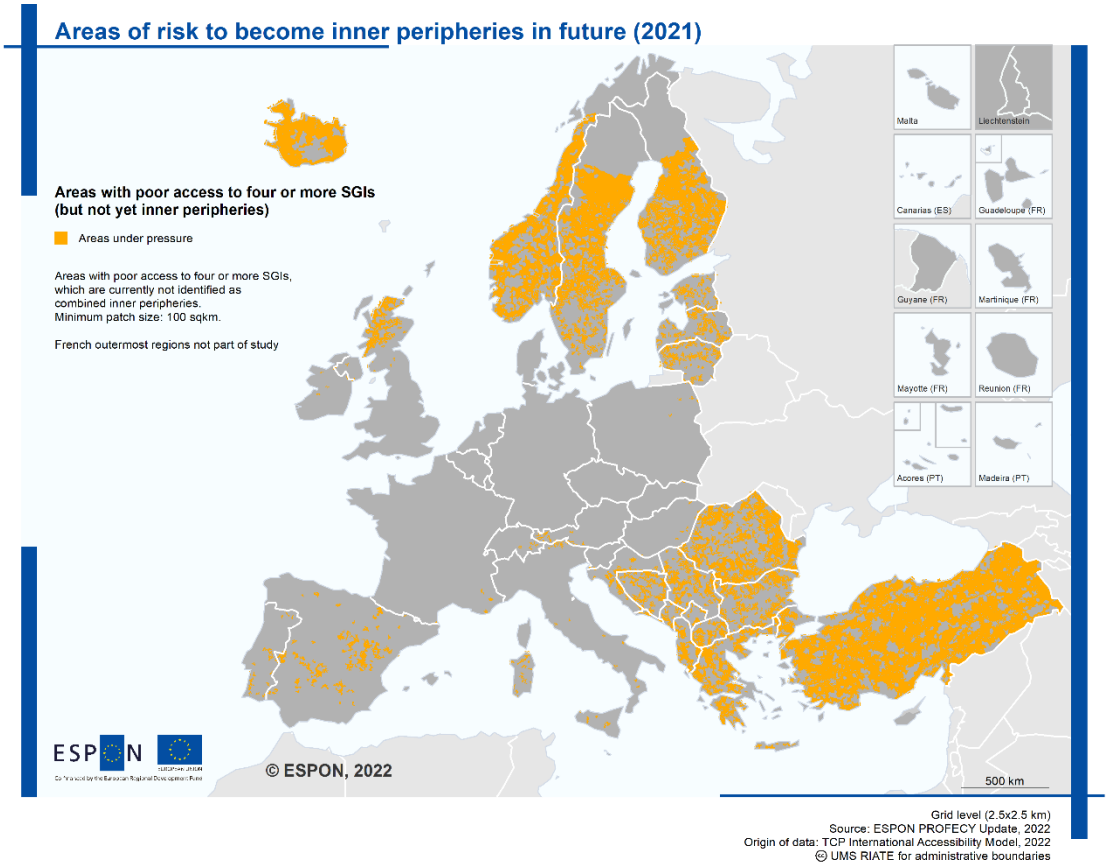


Figure 3-7. Comparison of IP patterns 2017 and 2021.

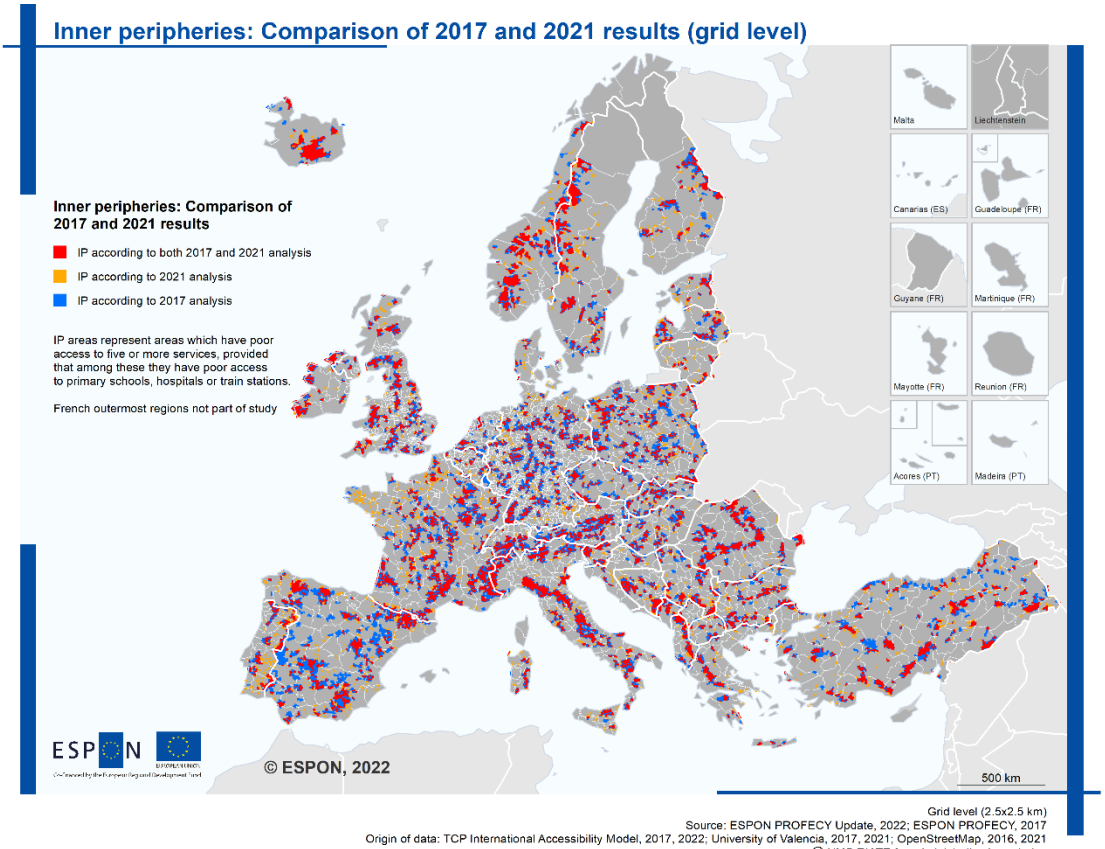
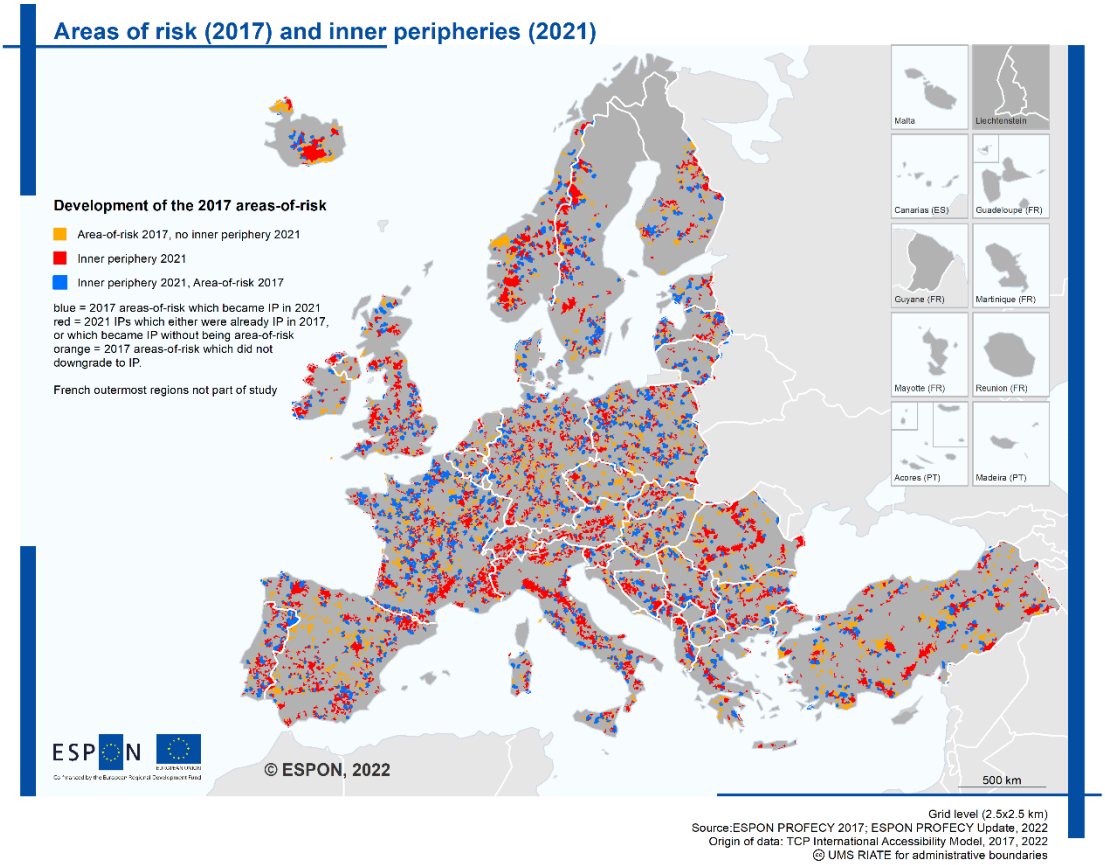


Figure 3-8. From areas-of-risk to inner peripheries.



4 Impact of health crises

The effects of border closures in the wake of the Corona pandemic were analyzed using the example of banks and shops on the basis of the indicator "number of reachable facilities" at grid level. In a first run, the facilities in a country plus those in neighbouring countries were considered as trip destinations. In a second run, only domestic facilities were considered. The difference in both results can then be considered as the impact of border closures on the accessibility and provision of services.

Results of this analysis are illustrated in the following four maps:

- Number of banks that no longer can be reached within 30 minutes car travel time
- Percentage of banks that no longer can be reached within 30 minutes car travel time
- Number of shops that no longer can be reached within 15 minutes car travel time
- Percentage of shops that no longer can be reached within 15 minutes car travel time

Figure 4-1. Number of banks that no longer can be reached within 30 minutes car travel time.

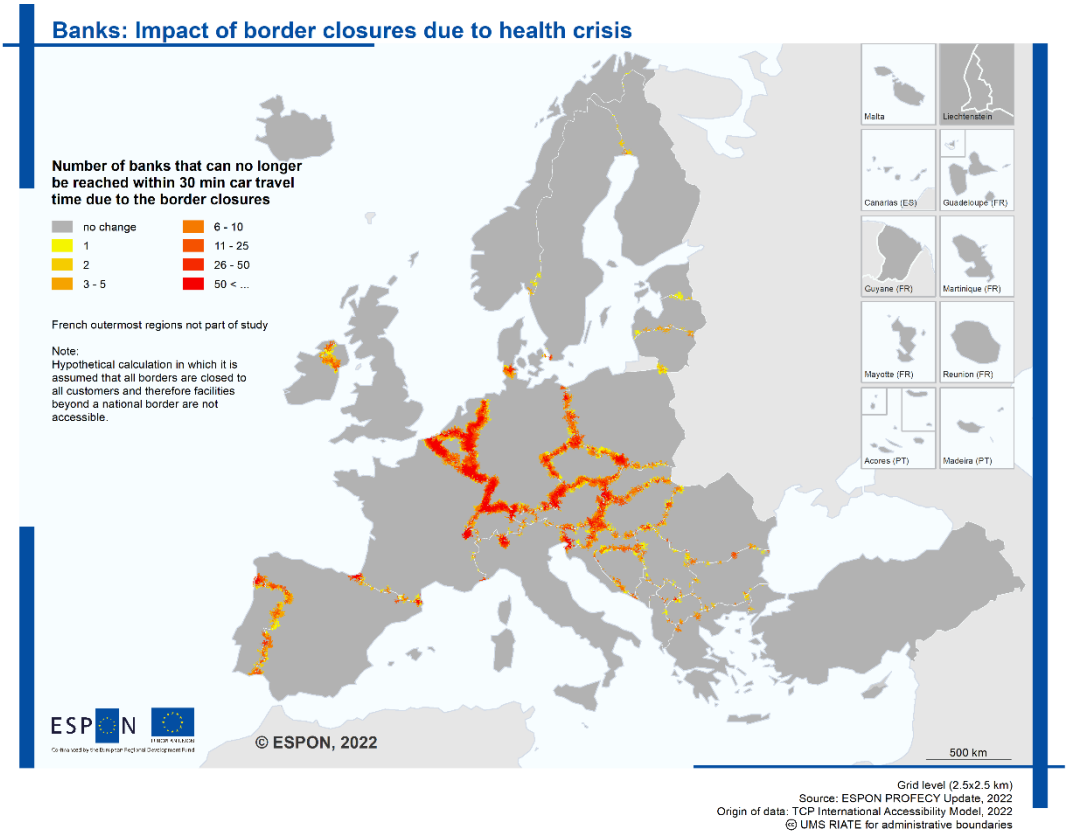


Figure 4-2. Percentage of banks that no longer can be reached within 30 minutes car travel time.

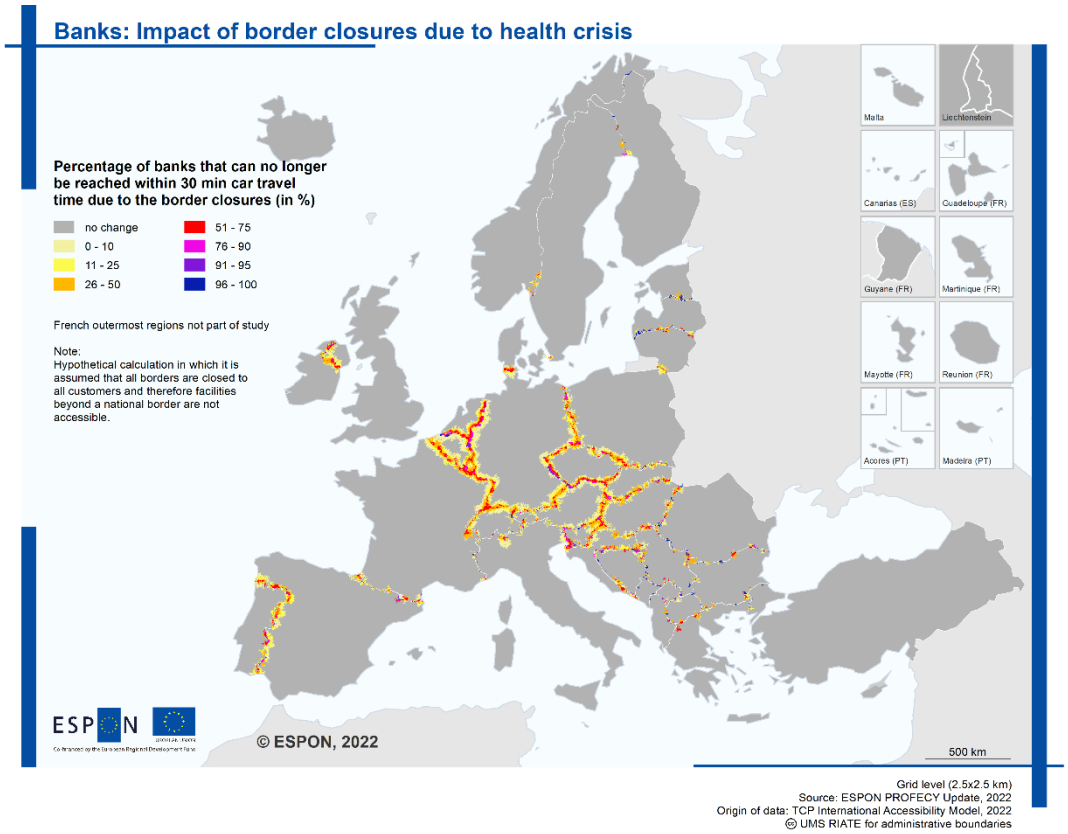


Figure 4-3. Number of shops that no longer can be reached within 15 minutes car travel time.

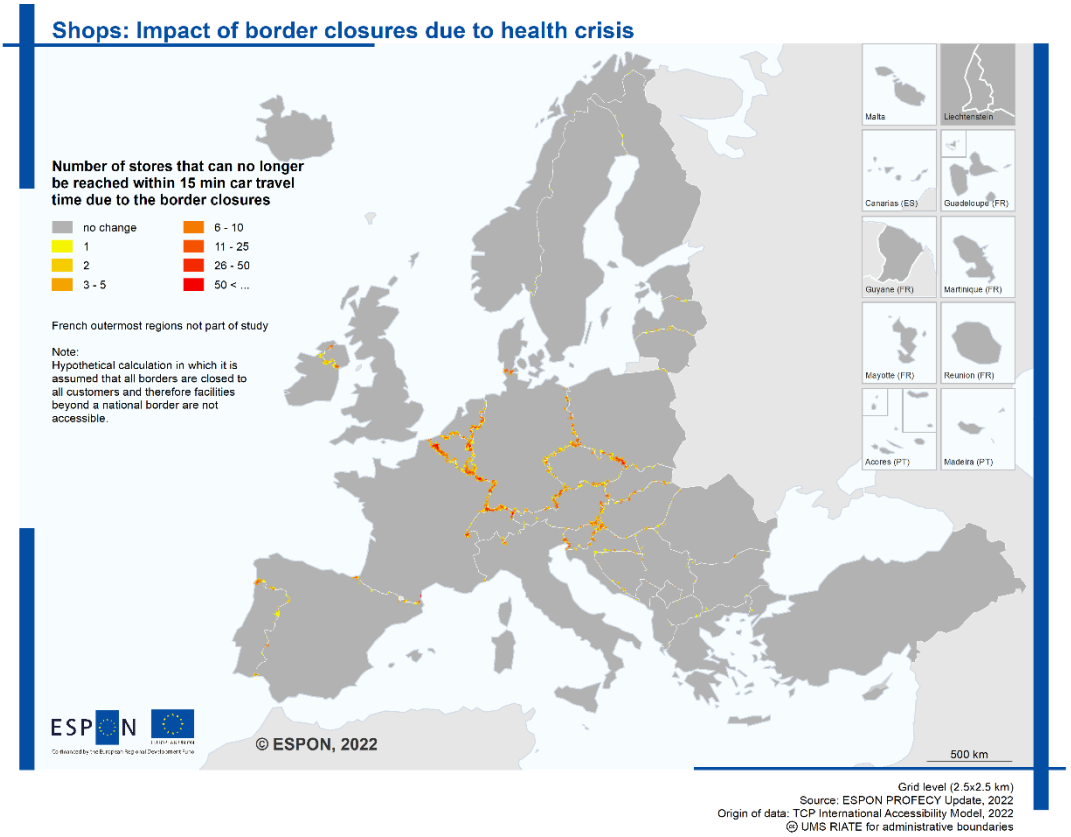
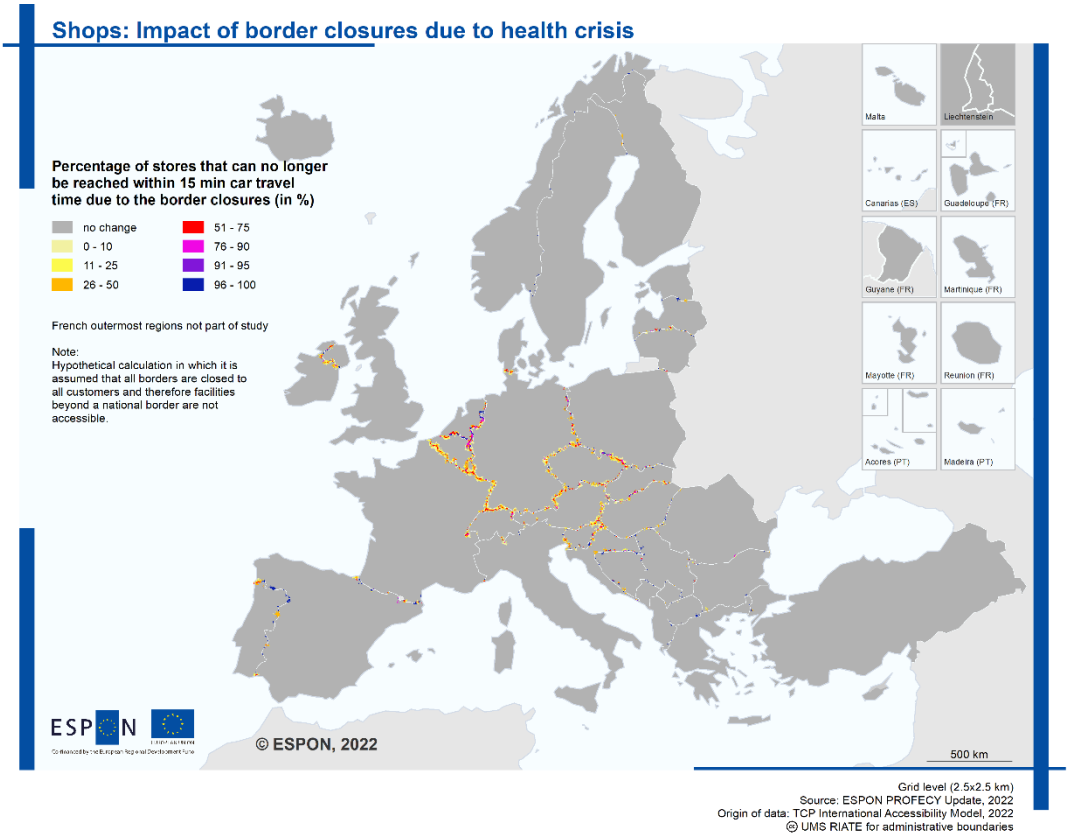


Figure 4-4. Percentage of shops that no longer can be reached within 15 minutes car travel time.



5 Development paths of inner peripheries regarding unemployment

The analysis of unemployment rate dynamics (15+) was based in position shifts over the 2009-2019 period (methodological steps are described in Tagai, Ortega-Reig and del Alcàzar, 2017). Only regions assigned as inner peripheries were processed. Unemployment rate data at NUTS2 level was downscaled to NUTS3 areas identified as inner peripheries. Time-series of ten years were broken down to three periods (of three-four years), and the degree of change within these periods and the overall direction and degree of dynamics were assessed. The basic threshold for identifying significant changes was calculated using the average degree of change of analysed units (regarding the whole period) and the standard deviation of the distribution of these values. Basic trends are:

•Uptrend: If a (mathematically) positive overall change (>[average rate + Std. deviation value]) can be observed in the region or at least two of the three break-downs of periods can be characterised with significant positive change (>[average rate + Std. deviation value]).

• Mostly sideways with uptrend tendencies: if a (mathematically) positive overall change (<[average rate + Std. deviation value]) can be observed in the region and at least two of the three break-downs of periods can also be characterised with sideways tendencies (positive or negative).

• Change with positive tendencies: any other regions than ‘Uptrend’, ‘Downtrend’ and ‘Sideways’ with usually a (mathematically) positive overall balance, where a trend change occurred within one or another sub-period analysed.

• Change with negative tendencies: any other regions than ‘Uptrend’, ‘Downtrend’ and ‘Sideways’ with usually a (mathematically) negative overall balance, where trend change occurred within one or another sub-period analysed.

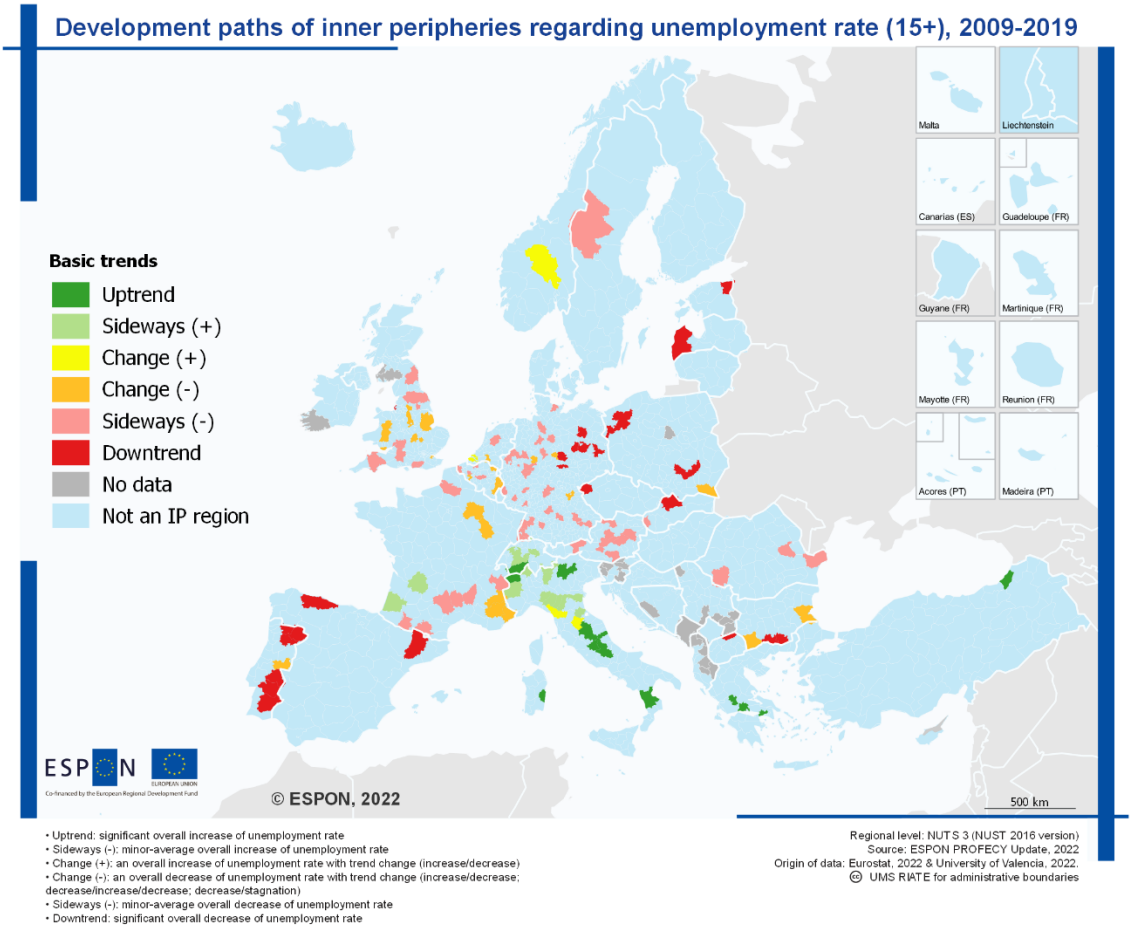
• Mostly sideways with downtrend tendencies: if a (mathematically) negative overall change (>[average rate - Std. deviation value]) can be observed in the region and at least two of the three break-downs of periods can also be characterised with sideways tendencies (positive or negative).

• Downtrend: if a (mathematically) negative overall change (<[average rate - Std. deviation value]) can be observed in the region and at least two of the three break-downs of periods can be characterised with a small degree of change (<[average rate - Std. deviation value]).

Results of this analysis are illustrated in the following maps:

- Development paths of inner peripheries regarding unemployment rate (15+), 2009-2019.

Figure 5-1. Development paths of inner peripheries regarding unemployment



- Uptrend: significant overall increase of unemployment rate
- Sideways (-): minor-average overall increase of unemployment rate
- Change (+): an overall increase of unemployment rate with trend change (increase/decrease)
- Change (-): an overall decrease of unemployment rate with trend change (increase/decrease; decrease/increase/decrease; decrease/stagnation)
- Sideways (-): minor-average overall decrease of unemployment rate
- Downtrend: significant overall decrease of unemployment rate

Regional level: NUTS 3 (NUST 2016 version)
Source: ESPON PROFECY Update, 2022
Origin of data: Eurostat, 2022 & University of Valencia, 2022.
UMS RIATE for administrative boundaries

References

Noguera, J.; Ortega-Reig, M.V.; del Alcázar, H.; Copus, C.; Berlina, A.; Moodie, J.; Mantino, F.; Forcina, B. Weck, S.; Beißwenger, S.; Hans, N.; Tagai, G.; Koós, B.; Kóvacs, K.; Uzzoli, A.; Dax, T.; Manchold, I.; Schürmann, C.; Tobiasz-Lis, P.; Dmochowska-Dudek, K.; and Wójcik, M. (2017a). *PROFECY – Processes, Features and Cycles of Inner Peripheries in Europe*. Final Report. ESPON.

Noguera, J.; Ortega-Reig, M.V.; del Alcázar, H.; Copus, C.; Berlina, A.; Moodie, J.; Mantino, F.; Forcina, B. Weck, S.; Beißwenger, S.; Hans, N.; Tagai, G.; Koós, B.; Kóvacs, K.; Uzzoli, A.; Dax, T.; Manchold, I.; Schürmann, C.; Tobiasz-Lis, P.; Dmochowska-Dudek, *K.; and Wójcik, M. (2017b). PROFECY – Processes, Features and Cycles of Inner Peripheries in Europe*. Handbook. ESPON.

Tagai, G.; Ortega-Reig, M.V.; del Alcázar, H. *Annex 8. Analysis of inner peripherality in Europe. PROFECY – Processes, Features and Cycles of Inner Peripheries in Europe*. ESPON.

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