1 Service provision: Definition and trends

This chapter defines the scope of the report, discusses megatrends affecting the delivery of services, and summarises current discussions on planning for service provision. It starts with this report's definition of public services, the scope of the services considered and the territorial typologies used in the analysis. It then describes how depopulation, ageing and climate change are affecting the provision of services in OECD countries. Finally, the chapter discusses the relationship between costs and access to public services and outlines forward-looking strategies for service provision in the context of demographic change.

Main takeaways

- This report considers two social services of general interest, healthcare and (primary and secondary) education, as provided in facilities to which users travel.
- Health spending as a share of GDP is projected to increase on average from 8.8% in 2015 to 10.2% by 2030 for OECD countries, with demographic changes accounting for about one-fourth of the overall projected change. These trends stress the need for strategies addressing the efficiency of public service provision.
- Regions covering about half of the European territory are projected to have negative population growth in 2011-35, with a decline concentrated largely in non-metropolitan regions.
- Many rural communities that suffer from depopulation are at risk of a stagnating economy, lack of professional opportunities and increasing poverty and social exclusion. In fact, 31 million people (7% of the EU population) live in a region that faces the twin challenge of rapid population decline and low GDP per head.
- Lower density areas have fewer specialists, more difficulty in attracting the right skills, higher infrastructure costs and a smaller population to draw users to provide services at scale and a smaller local tax base to finance local services.
- Population decline directly affects the provision of public services by shrinking the pool of potential users, leading professional shortages and forcing facilities to close and consequently increasing distance to services for users in remote areas.
- The geography of population aging is uneven as non-metropolitan regions, especially remote ones, experience more rapid aging than others. This has implications for the current and future demand for health services such as cardiology.
- Accessibility, by measuring the ease of reaching opportunities, indicates both the availability of service and the ease with which the service can be reached by users. It is a useful measure of both evaluating the performance of transport and land use interactions and the need for new services based on equity grounds.
- Poor access to public services, low accessibility, lack of economic competitiveness and innovation are both causes and consequences of depopulation.

Introduction

Public service provision and delivery is one of the main mandates of regional and national governments in OECD and European countries. Education and health services, with their place-based characteristics and frequent use, respond to the widespread need of citizens and constitute the most important part of public service provision. Providing public services that are equitable, affordable, accessible and of high quality is challenging for governments in many ways. The capacity of the government to deliver on their service provision mandate has been put under further pressure by budgetary constraints and cuts following the 2008 financial crisis; demographic trends such as depopulation and ageing that affect the demand for services; and notably the current COVID-19 pandemic. More than ever, governments at all levels need to manage costs in order to allocate scarce and limited public resources into provision of services while ensuring adequate access to services of comparable quality to citizens everywhere.

Providing services in places with smaller and more dispersed populations is more difficult and possibly more costly than in denser places. This happens because lower density means higher transportation costs, loss of economies of scope and economies of scale, and greater difficulty in attracting and retaining professionals (e.g. health care professionals) (OECD, 2021[1]; OECD, 2018[2]; OECD, 2017[3]; OECD, 2017[4]; OECD, 2016[5]). The link between cost of service provision and density levels suggests the need for a differentiated policy strategy with a clear spatial approach. However, there are currently no internationally comparable data on public services cost and access.

Service provision has a place-based dimension requiring considering cost and access simultaneously. Cost efficiency increases with scale, and sometimes achieving scale comes at the cost of longer travel times for users. While a direct way to decrease the cost of service delivery is to increase the scale of provision, public investments must still recognise choices by citizenry about where to live. Ensuring minimum access as mandated by law must weigh the relative benefits of adding more service points versus improving road networks and encouraging less dispersed settlements.

In this context, population ageing and the increasing sparsity of some territories experiencing depopulation are likely to put additional strain on service delivery costs and quality in the near future. For some rural dwellers, particularly seniors, relocation is not always a viable option due to higher housing costs in urban locales and the loss of social networks that are critical to quality of life and wellbeing. Moreover, shrinking and ageing populations together with a lower tax base has further pressed governments to adapt to new conditions amidst growing demand and higher costs. For instance, while the economic future of rural communities depends on an educated and well-trained workforce, a shrinking population can decrease the minimum efficient scale for high-quality education.

A companion thematic report *Delivering Quality Education and Health Care to All* (OECD, 2021[1]) identified "good practices" in terms of rural public service provision, including innovations in service delivery (new approaches, partnerships and technologies) and conditions for success. The report aimed to help countries in their tasks to deliver public services in health and education, by establishing long-term strategies that can be sustainable according to population trends and innovative solutions.

This report aims to provide a better understanding of policies to address present and future public service provision by assessing the drivers of geographical differences in costs and access to education and health services. In particular, for primary and secondary schools; cardiology; and maternity and obstetrics services this report:

- offers new internationally comparable fine-grained estimates of service costs
- compares user travel distances based on simulated school and health service locations
- estimates changes in costs driven by future population changes
- sheds light on the present and future effect of demographic change on access to services in rural areas.

While this report offers estimations at different geographical levels for EU27 countries and the United Kingdom, the novel methods for estimating cost and access and using foresight to analyse policy scenarios can be reproduced in any context with available population grids.

This chapter sets the scene for the report, starting by outlining key definitions, continuing with a description of megatrends affecting the provision of services in OECD countries, and ending with a discussion on the relationship between accessibility and service provision and forward-looking planning strategies in the context of population decline and demographic change.

Definitions and typologies

Public services are an ample concept that englobes a range of services where governments have a role in ensuring provision which has nevertheless evolved in time. This section starts with outlining the definition of public services used in this report and continues with an outline of the territorial typologies used in the analysis.

What is understood by public services on this report

Public services are all those services that are rendered in the public interest. They are based on the notion that there is a social consensus that some services should be available to all and that—due to a lack of scale or significant externalities—it is the state that should be involved in the provision of those services in some way.[1] This broad definition conceals a great deal of choice in terms of what those services are, how they are delivered, and by whom. Table 1.1 outlines the main ways in which public services can be classified: according to function, provider (public/private), cost (free versus fee based), who benefits, and where the service is consumed geographically (see and Box 1.1 for an outline of previous classifications of public services).

Table 1.1. Classifying public services

Function	Services to guarantee basic physical conditions and to overcome locational disadvantages	Services to guarantee basic social conditions	Services supporting quality of life	Services to enterprises
Provision	Fully public	Association or non-profit	Private	Mixed public, private or non-profit
Cost	No fee open to access	Fee based (full or partial)		
Target population	Universal benefits	Targeted benefits		
Geography of consumption	Point-specific consumption of public service	Public services requiring continuous connection (line or network)	Digital consumption	

Box 1.1. Classifications of public services

Previous OECD work has classified public services according to their functions, along with four main types:

1. **Services to guarantee basic physical conditions** and to overcome locational disadvantages such as telecommunications infrastructure, electricity, waste supply and sewage, waste disposal, roads, and transport.
2. **Services to guarantee basic social conditions** such as social security, employment and training services, social housing, child care, long-term care, and social assistance services.
3. **Services supporting quality of life** such as sports and cultural facilities.
4. **Services to enterprises related to administration** (business registries) or direct or indirect aid such as export development services, business grants, etc. (OECD, 2010[6]).

Other classifications of public services have focussed on who benefits from them. Public services may be delivered with universal access or they may be targeted to certain populations – e.g. access may be determined by income thresholds. Others have made this distinction based on class dimension. For example, Lonsdale et al. distinguish between public services that disproportionally benefit middle- and higher-income groups (e.g. public universities, airports, art galleries) versus those that benefit lower-income ones (e.g. welfare programmes) regardless of whether they are universal or not (Lonsdale and Enyedi, 2019[7]).

While the public sector (national, regional, or local governments) is involved in the design, funding and delivery of public services, the line between what is public and what is private has become blurred with the adoption of new forms of service provision including contracting out and fee-based systems. Those services which are deemed 'public' in nature may be delivered by an entity that is fully or partially publicly-owned, private, mixed, an association, or a not-for-profit entity.[2] In this sense, public services are no longer synonymous with being free to all; they may involve fees. This report considers public services along with this definition without distinguishing private from public providers.

The European Commission distinguishes between public services (or "services of general interest") based on whether they are fee-based or not, categorising three types (European Commission, 2019[8]):

- Services of general *economic* interest are those basic services that are carried out in return for payment such as postal services.
- *Non-economic* services are services for which there are no fees such as the police, justice and statutory social security schemes.
- *Social* services of general interest can be payment/fee based or not and include social security schemes, employment services, and social housing.

Under this definition, this report considers two social services of general interest: healthcare and (primary and secondary) education.

Classifications that consider public services according to how they are consumed geographically are also relevant for this report. For example, some services may require consumers to travel to the place of use (e.g. airports, libraries, recreation centres, schools, and medical facilities); others, may be accessed through continuous connections and space (e.g. roads, water mains, power lines). From this perspective, services can be seen as either points (the former) or lines and networks (the latter) (DeVerteuil, 2000[9]). Some services hold features of both points or lines/networks such as bus lines and the postal service. Digital services defy these categories – they are services delivered at point, requiring no travel on behalf of the consumer and no network beyond digital connectivity, however that be delivered.

This report considers point-specific health care and education services (provided at schools or service locations) to which users travel. It does not consider services that require continuous connections or services provided digitally.

Territorial typologies to evaluate service provision

Settlement patterns are one of the most important determinants of service provision. Dispersed populations and longer distances to services reduce access and increase inequalities, leading to such phenomena as 'medical deserts' (Pierron and Roca, 2017[10]; Sanz-Barbero, Otero García and Blasco Hernández, 2012[11]). Areas outside cities, especially those with lower density and more difficult access, have thinner labour markets and fewer specialists, and more difficulty in attracting the right skills. These areas may also have at the same time higher provision costs and a smaller population to draw financial resources from to finance local services (Table 1.2).

Table 1.2. Characteristics of higher and lower density areas

Higher density areas	Lower density areas
• Higher access to services • Thicker labour markets • More diversified labour market • Larger number of specialists • Lower infrastructure and transportation costs • Larger population for locally financed services	• Lower access to services • Thinner labour markets • Less diversified labour market • Fewer specialists • Higher infrastructure and transportation costs • Smaller population for locally financed services

To analyse the cost and access to services varies across places in Europe, this report uses two territorial classifications at two levels of geographical aggregation: the degree of urbanisation classification at the 1 km^2 grid-cell level, and the TL3 regional typology based on access to cities (see Box 1.2 and Box 1.3).

The two typologies are useful for describing the concentration of population and its geographical dispersion. According to the degree of urbanisation, more than half of the population in EU-27 countries and the United Kingdom concentrate in cities and towns and suburbs, while sparse rural areas concentrate little population but the majority of land (Table 1.3). On the other hand, according to the regional typology based on access to cities, around 60% of the EU27+UK population lives in metropolitan regions, and the largest share of the remaining 40% lives in regions close to cities (Table 1.4). The share of population in remote regions is particularly relevant to service provision because their sparsity is high and distances long. This share varies considerably across EU27+UK countries, being highest in large countries with difficult terrain and/or weather including Sweden, Finland, Greece, and in small Eastern European and Baltic countries including Latvia, Croatia, and Estonia (Figure 1.1).

Table 1.3. Share of land and population by degree of urbanisation, EU27+UK

2011

	Share of land EU27+UK	Share of population EU27+UK
Sparse rural areas	95%	18%
Villages	2%	12%
Towns and suburbs	3%	33%
Cities	1%	37%

Source: Authors' elaboration based on (Eurostat, 2021[12]) and (OECD, 2021[13]).

Table 1.4. Share of population by type of TL3 region, EU27+UK

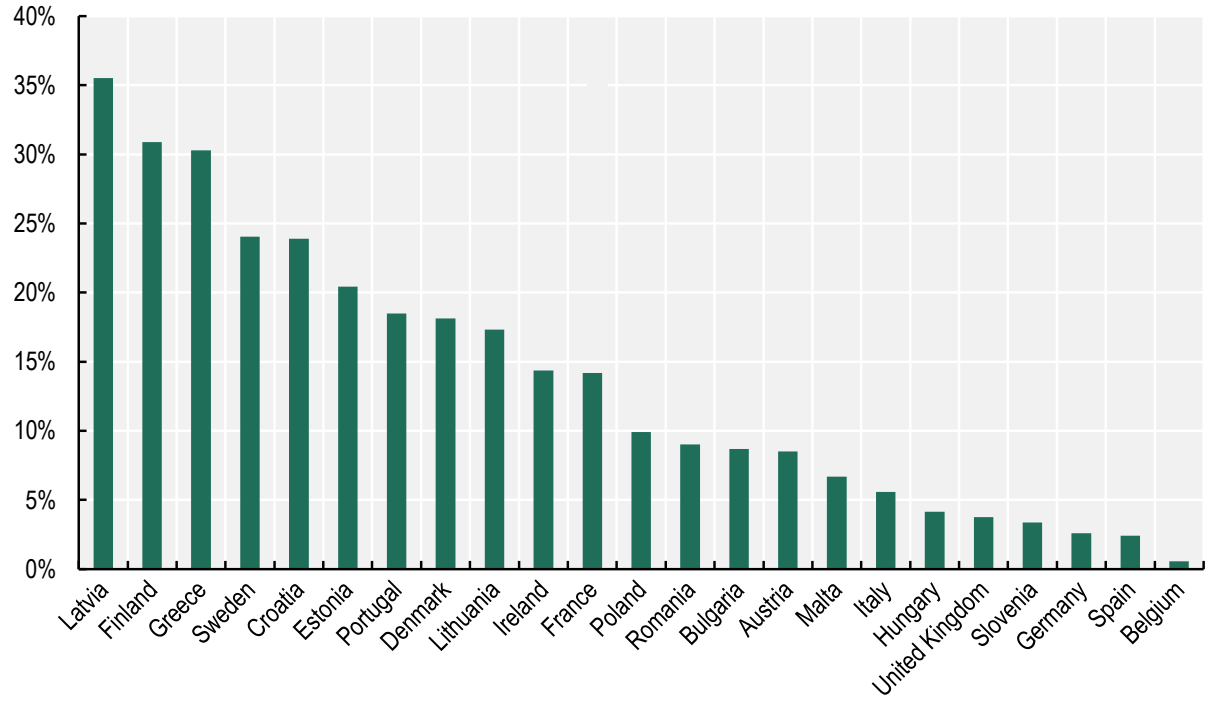
2020

Type	Share of population (%)	Projected population growth (%), 2011-35	Median age (years)
Metropolitan Regions	60.6	17.44	44.3
Non-metropolitan regions close to metropolitan areas	15.4	-8.91	46.4
Non-metropolitan regions close to small metropolitan areas	15.9	-25.75	45.4
Non-metropolitan remote regions	7.7	-31.15	46.8

Note: 2019 data for the United Kingdom. Population change is the average compounded annual growth in 2011-35.
Source: Authors' elaboration based on (Eurostat, 2021[12]; Goujon et al., 2021[14]; OECD, 2021[13]; Jacobs-Crisioni et al., n.d.[15]).

Figure 1.1. Share of population in remote TL3 regions, EU27+UK

2020



Note: 2019 population for the United Kingdom. Missing countries do not have any remote regions.
Source: Eurostat (2021[12]), "Population change - Demographic balance and crude rates at regional level", https://ec.europa.eu/eurostat/cache/metadata/en/demo_r_gind3_esms.htm; OECD (2021[13]), OECD Regional Statistics, www.oecd.org/regional/regional-statistics/.

StatLink https://doi.org/10.1787/888934245880

Box 1.2. Degree of urbanisation classification

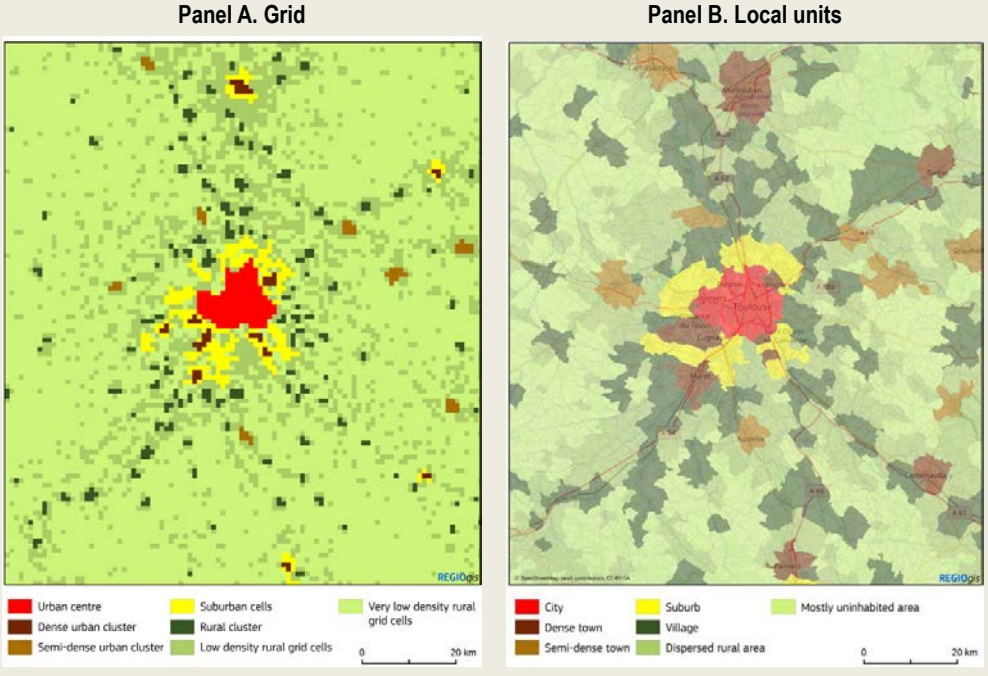
Method to classify grid-cells by their Degree of Urbanisation, levels 1 and 2

The Degree of Urbanisation was designed to create a simple and neutral method that could be applied in every country in the world. It relies primarily on population size and density thresholds applied to a population grid with cells of 1 by 1 km. The different types of grid cells are subsequently used to classify small spatial units, such as municipalities or census enumeration areas (see Figure 1.2 for an example). The Degree of Urbanisation was endorsed by the UN Statistical Commission in March 2020.

The Degree of Urbanisation level 1 classifies the entire territory into:

- Cities, with a population of at least 50 000 in contiguous grid cells with a density of at least 1 500 inhabitants per km^2.
- Dense towns, with a population between 5 000 and 50 000 in contiguous grid cells with a density of at least 1 500 inhabitants per km^2.
- Semi-dense towns, with a population of at least 5 000 in contiguous cells with a density of at least 300 inhabitants per km^2 and are at least 2 km away from the edge of a city or dense town.
- Suburbs, with most of their population in contiguous cells with a density of at least 300 inhabitants per km^2 that are part of a cluster with at least 5 000 inhabitants but are not part of a town.
- Villages, with between 500 and 5 000 inhabitants in contiguous cells with a density of at least 300 inhabitants per km^2.
- Dispersed rural areas, with most of their population in grid cells with a density between 50 and 300 inhabitants per km^2.
- Mostly uninhabited areas, with most of their population in grid cells with a density of less than 50 inhabitants per km^2.

Figure 1.2. Degree of urbanisation level 2 grid classification around Toulouse, France



In this report, these categories are collapsed into four categories: 1) **sparse rural areas** (composed of mostly uninhabited areas and dispersed rural areas); 2) **villages**; 3) **towns and suburbs**; and 4) **cities**.

Source: European Commission/ILO/FAO/OECD/UN-Habitat/World Bank (2020), "A recommendation on the method to delineate cities, urban and rural areas for international statistical comparisons", Statistical Commission background document, 51th session, 3-6 March 2020. Items for discussion and decision: demographic statistics. Available at https://unstats.un.org/unsd/statcom/51st-session/documents/BG-Item3j-Recommendation-E.pdf.

Box 1.3. Classifying European TL3 regions by their level of access to cities

The regional classification based on access takes into consideration the presence of and access to Functional Urban Areas (FUAs). Access is defined in terms of the time needed to reach the closest urban area; a measure that takes into account not only geographical features but also the status of physical road infrastructure.

The typology classifies TL3 regions into metropolitan and non-metropolitan according to the following criteria:

Metropolitan TL3 region (MR), if more than 50% of its population live in a FUA of at least 250 000 inhabitants.

Non-metropolitan TL3 region (NMR), if less than 50% of its population live in a FUA. NMRs are further classified according to their level of access to FUAs of different sizes into:

- ***Close to metropolitan (NMR-M)***, if more than 50% of its population lives within a 45 minute-drive from a metro (a FUA with more than 250 000 people).
- ***Close to small metropolitan (NMR-S)***, if the TL3 region does not have access to metro and 50% of its population has access to a small or medium city (a FUA of more than 50 000 and less than 250 000 inhabitants) within a 45 minute-drive.
- ***Remote (NMR-R)***, if the TL3 region is not classified as NMR-M or NMR-S, i.e. if 50% of its population does not have access to any FUA within a 45-minute drive.

Driving time by road to the nearest city depends on the definition of the cities, the road network used, the boundaries of the regions and the spatial distribution of the population within the region. In the implementation, cities are represented by their centroid point, defined as the population-weighted average location of the centroids of 1 km² grid cells covering the city. Around these centroid points, service areas of 45 minutes by major and secondary roads are calculated. The generic speed attribute provided with the road network data is used, so that it does not take into account possible traffic congestion issues.

All service areas are merged to create an accessibility surface characterised by its maximum driving time to at least one city. This surface is then overlaid with the centroid points of 1 km² population grid cells. All centroids falling within the accessibility surface are defined as "close to a city", the other cell centroids as "remote". From this, it is possible to determine which part of the TL3 population is located in areas close to a city by calculating the share of regional population living close to a city.

Source: European Commission (2021), Assessing remoteness of regions: An update. Internal document, DG Regional and Urban Policy; Eurostat (2019[16]), *Methodological manual on territorial typologies: 2018 Edition*, https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-GQ-18-008; Dijkstra and Poelman (2008[17]), *Remote Rural Regions: How proximity to a city influences the performance of rural regions*, https://ec.europa.eu/regional_policy/en/information/publications/regional-focus/2008/remote-rural-regions-how-proximity-to-a-city-influences-the-performance-of-rural-regions; Fadic et al. (2019[18]), "Classifying small (TL3) regions based on metropolitan population, low density and remoteness", *OECD Regional Development Working Papers*, https://doi.org/10.1787/b902cc00-en; OECD (2020[19]), *Rural Well-being: Geography of Opportunities,* OECD Rural Studies, https://doi.org/10.1787/d25cef80-en.

Public services under pressure

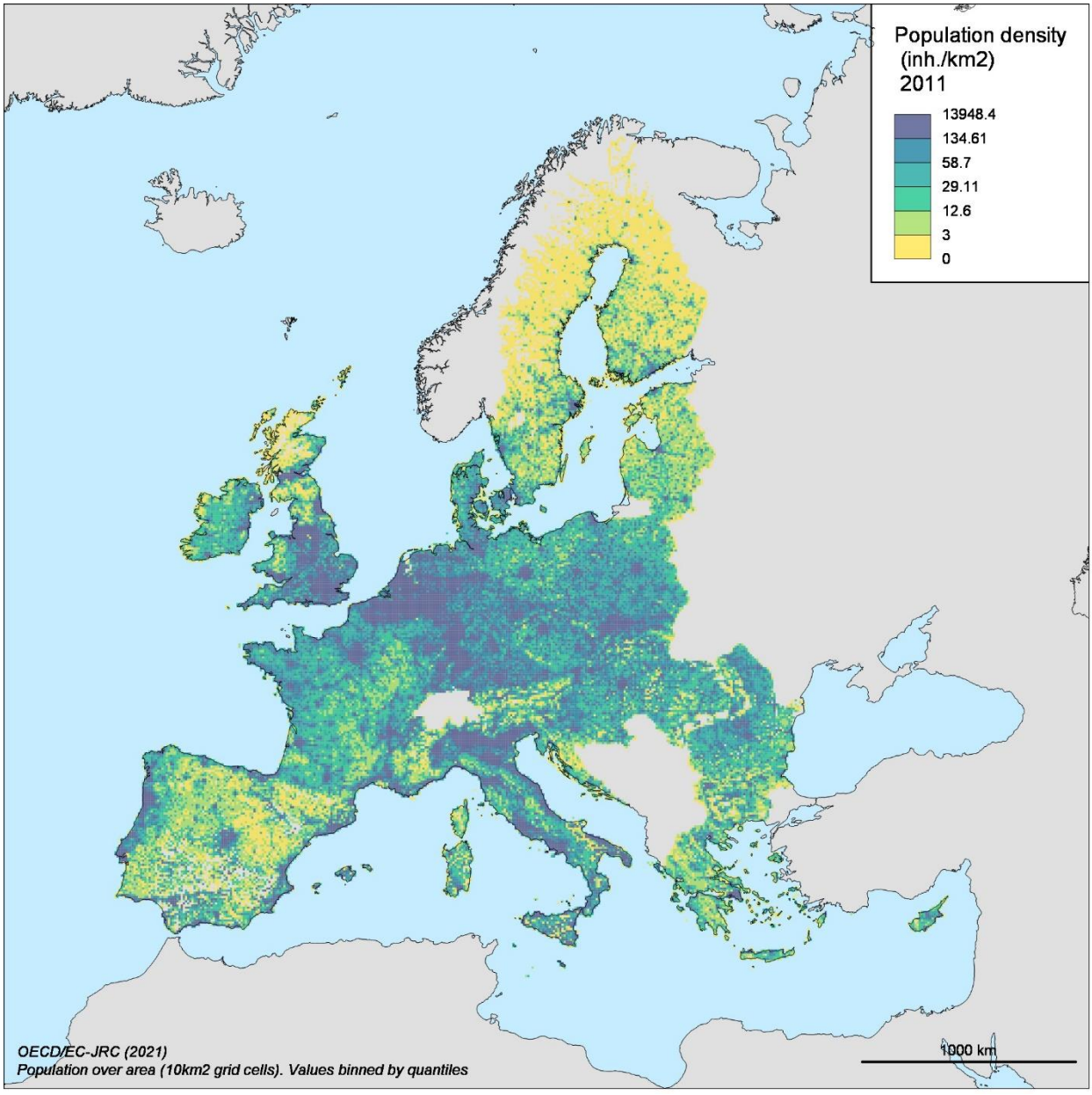
The rising costs of public services —particularly health care and social care—are present in media discourses across the OECD and are a source of growing concern for policy makers. Population aging is one of the main factors that is often pointed to as contributing to these costs, leading to what some have termed “apocalyptic demography”, a moral panic about the presumed rising health care costs (Walker, 2006[20]). However, as will be discussed, the picture is more complicated; on the one hand, demographic change is but one among several increasing health care costs (Gee, 2002[21]), on the other hand, the trend in healthy ageing in OECD countries acts as a counterforce to raising health care costs.

Depopulation and sparsity

Across Europe, variations in population density and remoteness already offer a picture of places facing access to services issues. While congestion in large cities can become an issue for access, the concentration of potential user services already facilitates providing services such as education and health care at scale. In vast sparsely populated areas of Europe, such as parts of the Iberian peninsula, northern Scandinavia or mountainous areas in the Balkans (Figure 1.3), services may be provided in facilities operating below their minimum viable scale. Achieving scale in many cases may not even be possible without stretching user travel times beyond reasonable limits.

Figure 1.3. Population density, EU27+UK

2011

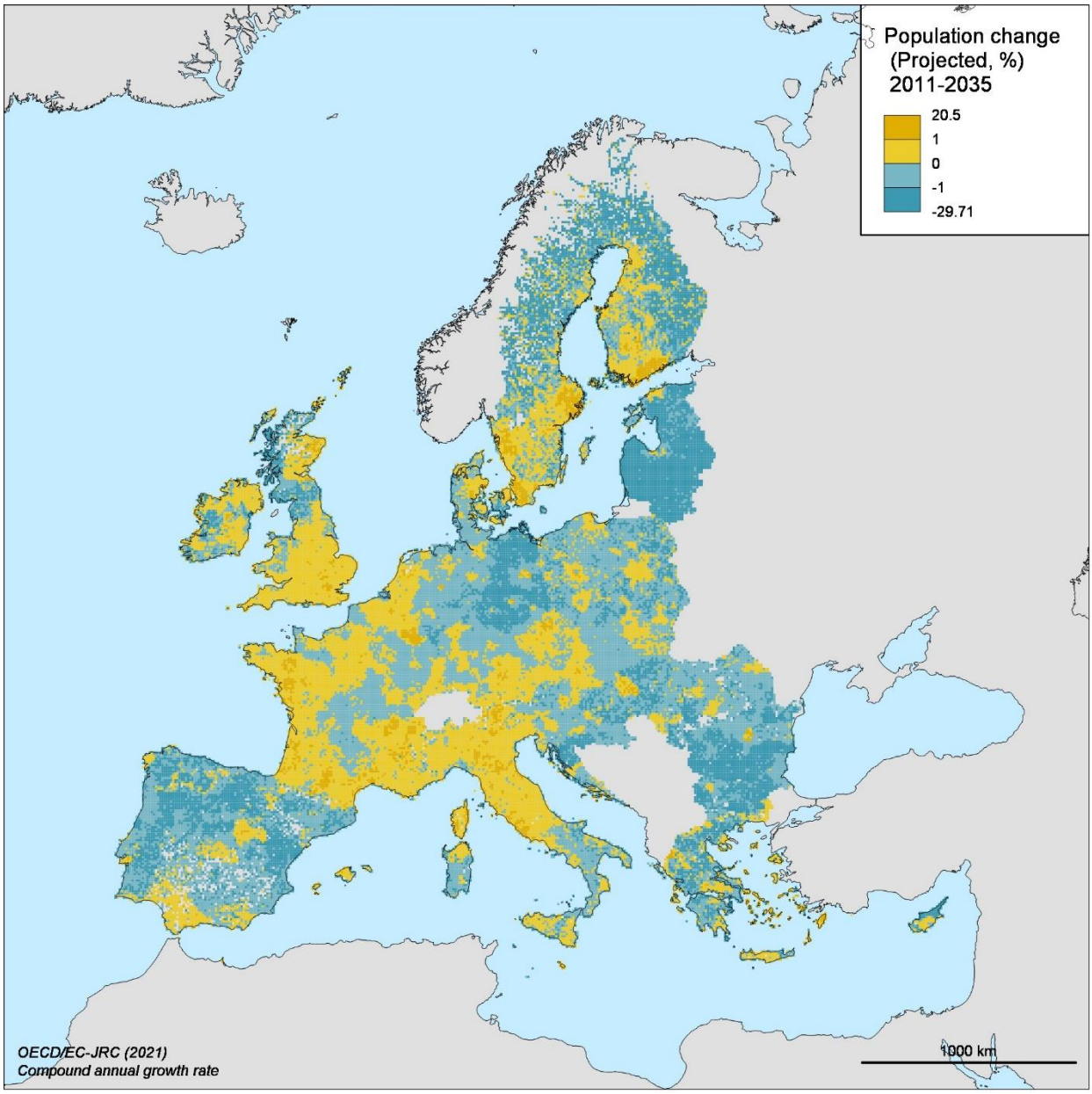


Source: Authors' elaboration based on (Goujon et al., 2021[14]) and (Jacobs-Crisioni et al., n.d.[15]).

Within the European Union, 65% of people live in a region that saw population increases between 2011 and 2019. For the remaining share, population decline has become a prolonged trend. In fact, regions covering about half of Europe's territory are projected to experience negative population growth in 2011-35 (Figure 1.4), with a decline concentrated largely in non-metropolitan regions (Table 1.1).

Figure 1.4. Projected population change, EU27+UK

2011-35



Note: Change is calculated as compound annual growth rate in 2011-35.
Source: Authors' elaboration based on (Goujon et al., 2021[14]) and (Jacobs-Crisioni et al., n.d.[15]).

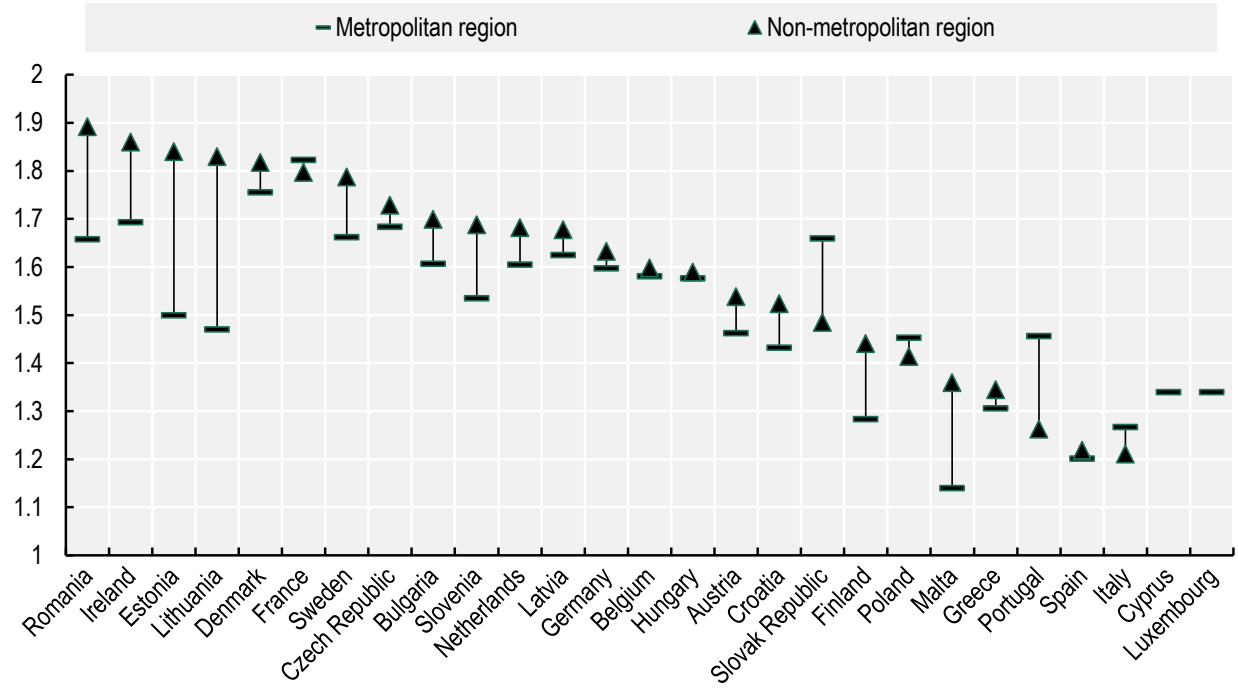
Around 30% of the OECD population lived in non-metropolitan regions in 2019 (OECD, 2020[19]), compared to 45% almost seventy years earlier. The reason for this population change is a steady and significant decline in fertility rates across the board in OECD countries, together with increasing population concentration in metropolitan regions.

Fertility rates declined dramatically across OECD countries, falling on average from 2.8 children per woman of childbearing age in 1970 to 1.6 in 2018 (OECD, 2019[22]) (OECD, 2021[23]), below the replacement levels needed to maintain the population in the long term in the absence of migration. Across

European countries, fertility rates are all below replacement levels and are considerably lower in Spain, Italy, and Greece. The rates are also higher in non-metropolitan regions than in metropolitan regions in all countries with available data except in the Slovak Republic, Portugal and to a lower extent Italy and France (Figure 1.5). The gap in fertility rate between types of regions is largest in Estonia and Lithuania.

Figure 1.5. Fertility rates by metropolitan and non-metropolitan regions, EU27

2019



Note: Total fertility rate computed by adding the age-specific fertility rates for women in a given year. It can be interpreted as the mean number of children that would be born alive to a woman during her lifetime if she were to pass through her childbearing years conforming to the fertility rates by age of a given year, and surviving.
Source: Eurostat (2021[12]), "Population change - Demographic balance and crude rates at regional level", https://ec.europa.eu/eurostat/cache/metadata/en/demo_r_gind3_esms.htm.

StatLink https://doi.org/10.1787/888934245899

Net migration, in turn, was positive in both metropolitan regions and regions near metropolitan areas, and negative other OECD regions in 2015. This suggests larger cities and their surrounding areas are attractive hubs for newcomers, whereas regions with or near a small/medium city and remote regions do not have the same level of attractiveness (OECD, 2020[19]).

The past decades have evidenced increasing concentration in or close to cities and away from remote and lower density areas across OECD countries. Metropolitan regions had twice as large population growth rates (0.70%) compared to non-metropolitan regions (0.33%) (OECD, 2020[19]). While peripheral rural areas tend to be more at risk of depopulation, lagging towns, cities and conurbations in OECD regions, for instance, those with industrial areas in decline, tend to lose population too. On the other hand, rural areas close to dynamic urban centres, as well as those with good connectivity to cities, have experienced population growth.

Projected population change has a direct link with current regional income levels. In Europe, most regions that experience rapid population growth have GDP per capita levels above the EU average, while regions with rapid population decline tend to have a comparatively low GDP per capita. In fact, 31 million people, or 7% of the EU population, live in a region that faces the twin challenge of rapid population decline and low GDP per head. Many of these regions are in the Baltic States, Bulgaria, Croatia, Hungary, Portugal, and Romania. Apart from this, many rural communities that suffer from depopulation are at risk of a stagnating economy, lack of professional opportunities and increasing poverty and social exclusion. Demographic developments may thus further exacerbate economic decline and thereby widen the gap between wealthy and poor regions (European Commission, 2020[24]; EPRS, 2020[25]; EPRS, 2019[26]).

Population decline directly affects the provision of public services by shrinking the pool of potential users, leading professional shortages and forcing facilities to close. As communities shrink and demand for services diminishes, some services may be either regionalised, reducing their accessibility, or withdrawn all together. A prime example of this is the closure of rural schools, which is a matter of intense debate, as such closures can initiate or accelerate a rapid decline in the social and economic well-being of rural communities (Lehtonen, 2021[27]; Johnson and Howley, 2015[28]). The OECD report *Delivering Education and Health Care to All* (OECD, 2021[1]) discusses policy options to address these issues, while this report focuses on estimating the effect of declining user bases on the cost of providing schooling and health care services.

Hospital or specific health service closure is another challenge brought by population decline. The closure of smaller hospitals, especially those in rural and remote areas, has major impacts on local communities (Vaughan and Edwards, 2020[29]; Kaufman et al., 2015[30]). OSU Center for Health Sciences (2021[31]) evaluated 173 closed hospitals in the US rural areas and found that the average distance between closed rural hospitals and the next nearest open facility is almost 18 miles, which creates an additional travel burden placed on patients. In the United States, more than 50 rural countries have lost all local hospital-based obstetric services since at least 2004, and mothers are reported to be more likely to give birth in an emergency room, or to give birth prematurely because of these closures (Kozhimannil et al., 2020[32]; Hung et al., 2017[33]).

The consequences of population decline are self-reinforcing when population loss leads to a deterioration of the quality of life which in turn results in more population decline (Elshof, van Wissen and Mulder, 2014[34]). Poor access to public services, low accessibility, lack of economic competitiveness and innovation are both causes and consequences of depopulation. While insufficient access to public services may cause a deterioration in the quality and diversity of services available, a weak local market results in underutilisation, poor maintenance and ultimately withdrawal or clustering of services (ESPON, 2018[35]). Fewer local education or job opportunities and choices, inaccessibility to public and transport services, lack of adequate infrastructure – such as broadband services – and inadequate health coverage accelerates migration out of depopulating areas (EPRS, 2019[26]).

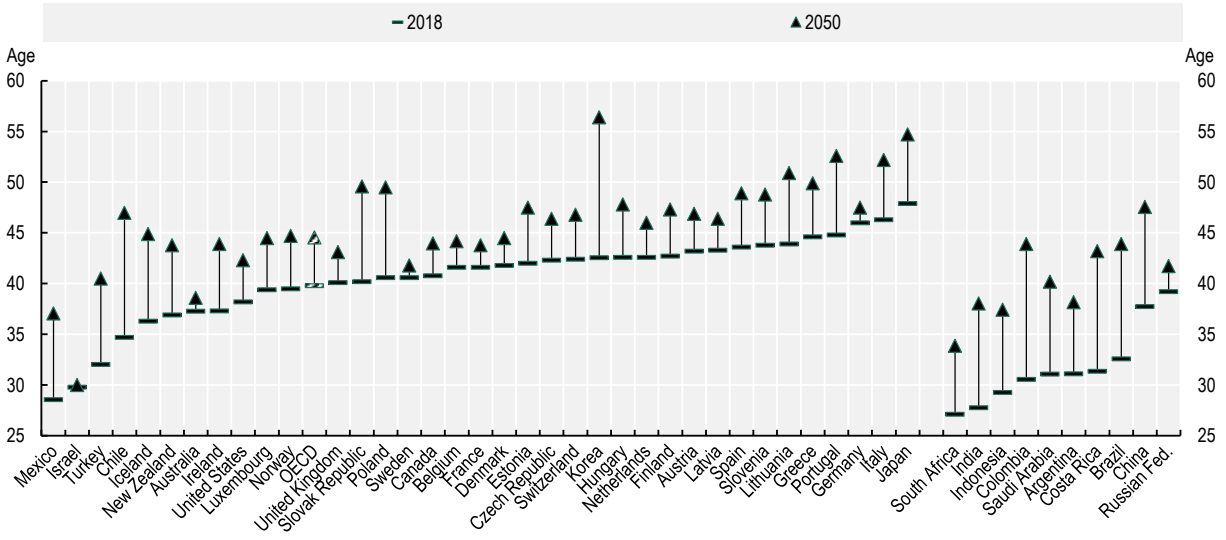
Ageing

Across OECD countries, people have been generally living longer and in better health today than in past decades. Before the COVID-19 pandemic, life expectancy exceeded 80.5 years across the OECD and was highest in Japan, at 83.9 years (OECD, 2019[36]). In Europe, life expectancy at birth increased by about 10 years over the last five decades, although in many countries this trend stagnated and even reversed in 2020 due to the COVID-19 pandemic.[3] Gains in life expectancy over time reflect increased health spending, healthier lifestyles and improving socio-economic conditions. In 2018, the median age of the population across the OECD stood at 39.8 years of age and it is anticipated that this will increase to 44.5 years of age by the year 2050 (Figure 1.6) (OECD, 2019[37]). Japan has by far the oldest population among OECD countries, with a median age of 47.9 in 2018 (estimated to increase to 54.7 by 2050); and

is followed by Italy Germany, and Portugal. Mexico, Israel, Turkey, and Chile have the youngest populations among the OECD.

Figure 1.6. Median age of the total population (in years), OECD countries

2018 and 2050



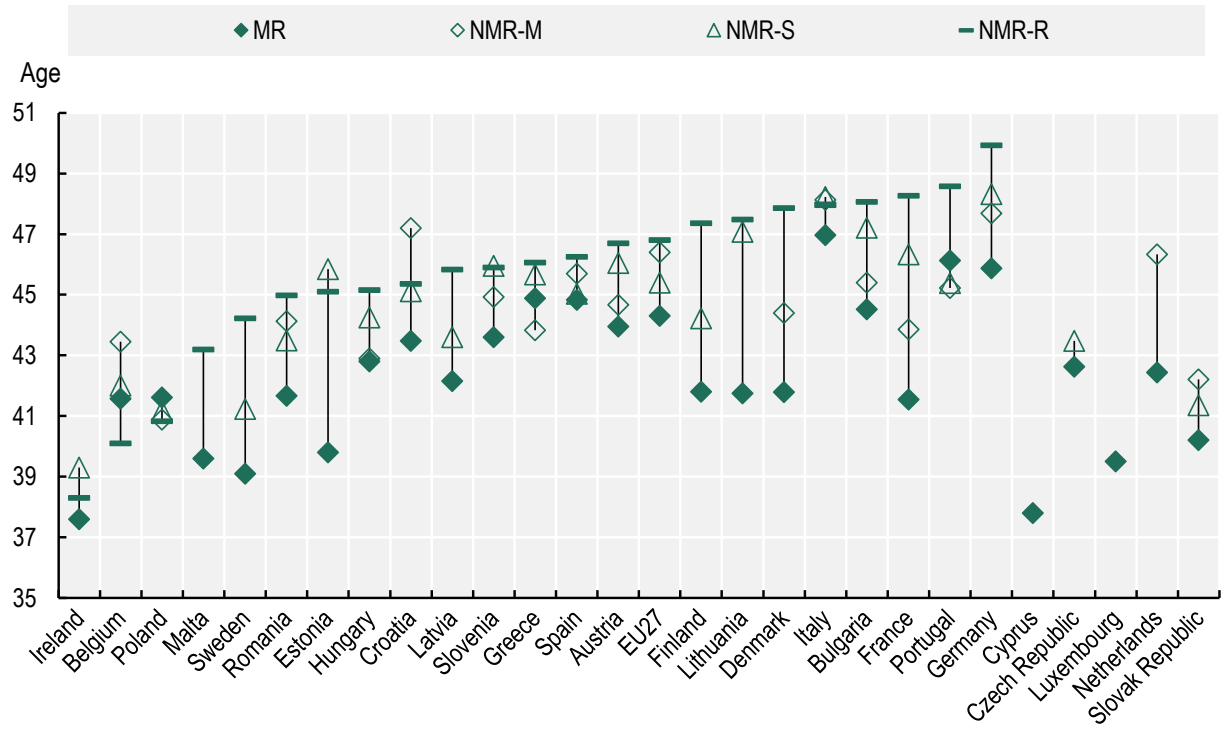
Source: OECD (2019[37]), "Rapid population ageing is widespread: Median age of the total population (in years), 2018 and 2050", in Working Better with Age, Ageing and Employment Policies, OECD Publishing, Paris, https://doi.org/10.1787/f67b8330-en.

In Europe, the median age of the population has been increasing for years and is projected to increase even more, from 44 years today to 49 years in 2070. The number and share of people in the older age groups is increasing as the median age increases: by 2070, 30% of people in Europe are estimated to be aged 65 and above, up from about 20% today. In the same period, the share of people aged 80 or over is projected to more than double to 13%. Similarly, Eurostat has estimated there will be more than half a million centenarians by 2050 (Eurostat, 2019[38]).

The geography of population aging is uneven. Some regions, particularly remote ones, experience more rapid population aging than others. In all 22 EU27 countries with remote regions except for Belgium and Poland, the average age of residents in remote regions is higher than that of metropolitan regions (Figure 1.7). This difference is the greatest in France, Denmark, Lithuania, and Finland, with remote regions having an average age over five years higher than metropolitan regions in 2020.

Figure 1.7. Median age by country and type of TL3 region, EU27

2020



Note: MR = Metropolitan regions, NMR-M = Non-metropolitan regions close to metropolitan, NMR-S = Non-metropolitan regions close to small metropolitan; NMR-R = Non-metropolitan remote regions.
Source: Eurostat (2021[12]), "Population change - Demographic balance and crude rates at regional level", https://ec.europa.eu/eurostat/cache/metadata/en/demo_r_gind3_esms.htm.

StatLink https://doi.org/10.1787/888934245918

The elderly dependency ratio—i.e. the ratio of the working-age population to that of seniors (ages 65 plus), is also higher in non-metropolitan regions in almost all OECD countries. The gap with metropolitan regions reaches 9 percentage points in seven OECD countries. Amongst non-metropolitan regions, the ones near a large city have the highest elderly dependency ratios (33%), followed by remote regions (31%) and regions close to a small/medium city (31%). Remote regions experienced, on average, the largest increases in elderly dependency between 2003 and 2019 (a 0.9 percentage point increase). Currently, the OECD-average elderly dependency ratios stand at 28.6%, and it is expected to increase to 35% by 2025 and to 53% by 2050. Greece, Italy, Japan, Korea, Portugal, and Spain are all expected to have elderly dependency ratios of over 70% by 2050 (OECD, 2020[19]).

Population ageing affects the delivery and financing of public services in a number of ways. Age is not synonymous with disability or ill health, however, the prevalence of both does increase with age and as such, can put pressures on the health care system. As such, policies to promote healthy aging are important to help individuals maintain their health while at the same time lowering healthcare costs by reducing the overall burden of disability and chronic disease. Beyond this, population aging is also associated with increased demand for long-term care; although, the prevalence of long-term care systems across the OECD differs (in some countries, family-provided care is more common).

Climate change

Increasingly frequent and extreme weather events due to anthropogenic climate change are bound to challenge the provision of public services. More extreme weather events such as flooding, heat waves and forest fires put a great deal of pressure on emergency responders and the health system. Extreme weather events can wipe out critical infrastructure, leaving communities isolated and at risk. Rural areas – and especially remote ones - can be particularly vulnerable due to their relative geographical isolation.

The two trends of population aging and climate change interconnect. For example, the elderly are at greater risk during heat waves. There are also spatial considerations. Rural areas tend to have a concentration of elder respondents who may be particularly vulnerable during extreme weather events, such as coastal areas that are prone to flooding (Rapaport et al., 2015[39]). Taken together, these phenomena place a lot of pressure on public services to adapt and respond in new ways.

Planning services for today and tomorrow

The provision of services cannot be disentangled from geography as still much of provision happens in physical facilities. This consideration is important for policies because both present and future costs and access to services depend on the distribution of human settlements, the demographic profile of countries, and the future evolution of population. This section starts with a discussion on the measurement of accessibility. It then turns to discussing the role of space and distance in the cost of providing services, and continues with planning considerations regarding the right scale of provision and the integration of different types of policies for service provision.

Measuring accessibility to services

The accelerating impacts of demographic changes have brought the provision of fair and balanced accessibility to public and private services to the forefront of regional inequality debates. Accessibility measures the ease of reaching opportunities using transportation means. It indicates both the availability of an activity (e.g. work, education, and health care) and the ease with which the location where such activity occurs can be reached from a given origin, usually a residential place (Kelobonye et al., 2020[40]). Measuring the ease of access is not only useful for evaluating the performance of transport and land use interactions (Cui and Levinson, 2019[41]), but also to understand inequalities in provision, and to estimate the need for new services (Marozzi and Bolzan, 2016[42]). Existing accessibility studies for Europe have focused on regional (potential) accessibility to understand regional growth, territorial cohesion, transport infrastructure improvements, and network efficiency (López-Torres and Prior, 2020[43]; Jacobs-Crisioni et al., 2016[44]; Spiekermann, 2015[45]; Vickerman, Spiekermann and Wegener, 1999[46]; Kompil, Demirel and Christidis, 2016[47]).

Box 1.4. Measuring accessibility

Accessibility is measured in a number of ways. In general, accessibility is measured as a combination of two different functions – activities that can be reached and cost of reaching them. An extensive review of accessibility measurements classifies them broadly into seven as: spatial separation measures, contour measures, gravity measures, competition measures, time-space measures, utility measures and network measures (Curtis and Scheurer, 2010[48]).

Among these, spatial separation and contour measures are highly suitable for measuring service accessibility and are therefore the most used accessibility indicators. Spatial separation measures travel impediment or resistance between origin and destination. Contour measures (including the cumulative opportunity model) define catchment areas by drawing one or more travel time contours around a node and measure the number of opportunities within each contour (jobs, employees, customers, etc.). For instance, research on monitoring shortages in provision of services has developed accessibility measures based on travel time and/or catchment areas for health care services (Pilkington et al., 2017[49]; McGrail, 2012[50]) and schools (McDonald, 2007[51]), among others.

Examples of studies focused on accessibility to services related to the analysis of this report include:

- A study by (Milbert et al., 2013[52]) showing comparative results on accessibility of Services of General Interest (SeGI) across five regions in Europe, including accessibility to low (primary schools), medium (railway stations) and high centrality (airports) services using high-resolution spatial data.
- A recent ESPON project studying the contribution of SeGIs to the competitiveness, economic development and job growth of European regions developed various indicators to explore availability, adequacy and provision of services, including physicians and hospital beds[4] (Fassmann et al., 2015[53]; Breuer et al., 2013[54]; Rauhut et al., 2013[55]).
- Studies focusing on regional or rural/urban inequalities in access to services, including a study on regional disparities of SeGI provision (Costa, Palma and Costa, 2015[56]), and a study on the centrality of SeGI service provision in rural and urban contexts (Rauhut and Komornicki, 2015[57]).
- A study by (Papaioannou and Wagner, 2018[58]) that develops location-based accessibility indicators for measuring accessibility to the closest school and hospital weighted by population, including comparable results in the form of travel times and speeds for private cars and public transport in 18 globally selected cities
- The ESPON project PROFECY (ESPON, 2017[59]), which used accessibility measurements (on travel time by car) to identify European regions with poor accessibility to regional (economic and demographic) centres and various services of general interests such as health care and education, banks, cinemas and train stations.

Several related studies handle service provision and accessibility with a facility simulation and location-allocation model-based approach:

- (Kompil et al., 2019[60]) simulate generic services at local and regional levels to explore spatial patterns of service accessibility across the European Union, highlighting urban-rural differences in terms of accessibility to simulated services at different levels.
- (Tillväxtanalys, 2011[61]) simulates public services' allocation based on the population distribution and estimates relevant costs leading to adopt a municipal finance equalisation in Sweden.
- (Souza, 2018[62]) presents a simulation-based decision support model to help urban planners dimension and locate urban facilities, as well as to define their expansion phases.
- (Xu et al., 2020[63]) study the interplay between the distributions of facilities and population that maximise accessibility over the existing road networks. They simulate different types of facilities to

estimate the number of facilities needed for reaching a desired average travel distance given the population distribution in a city.

In terms of the spatial allocation, accessibility and cost estimation methodology, this report follows an approach that is more similar to the approaches presented in (Kompil et al., 2019[60]) and (Tillväxtanalys, 2011[61]).

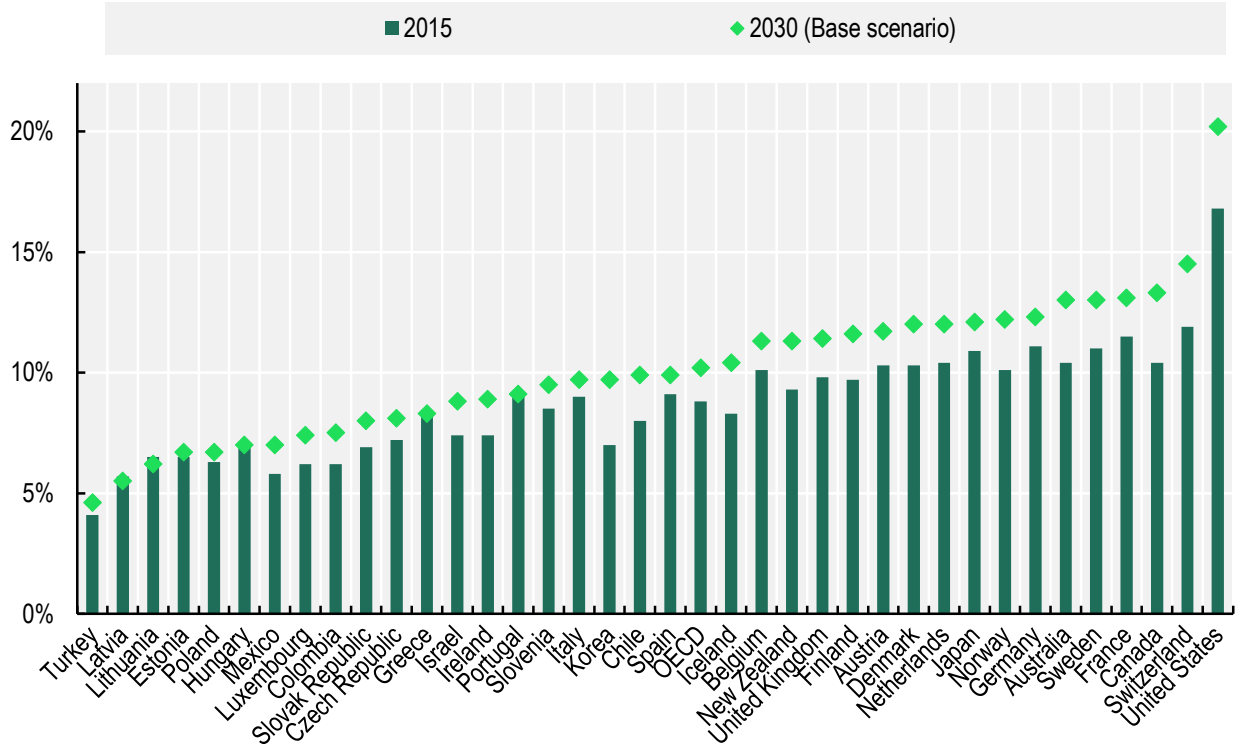
Geography and the cost of providing services

During the COVID-19 crisis, governments have raised public spending in order to strengthen the health system and support people and businesses with grants and subsidies. Already in 2017, on average general government expenditures in OECD countries amounted to 40.4% of gross domestic product (GDP), a 1.4 percentage points increase from 2007 (OECD, 2019[64]). Public social expenditures as a percentage of GDP had been already increasing by around 3.4 percentage points on average across the OECD between 1990 and 2018 (OECD, 2021[1]).

Even before the COVID-19 pandemic, an OECD study had projected health spending as a share of GDP to increase on average from 8.8% in 2015 to 10.2% by 2030 for OECD countries, with increases in 34 out of 37 OECD countries ranging from 0.1% in Greece to 3.4% in the United States (Figure 1.8) (Lorenzoni et al., 2019[65]). Across countries, demographic changes account for about one-fourth of the overall projected change for OECD countries, and contribute significantly more to projected annual spending in Canada (43%), Norway (41%), Mexico (40%), Switzerland (40%), and Korea (38%).

Figure 1.8. Country-specific growth in health spending per capita, OECD countries

Average yearly growth, 2000-15 and 2015-30 (base scenario)



Note: The baseline scenario estimates health spending in the absence of any major policy change. Empirically, this scenario uses estimates based on the preferred specification for the income elasticity, productivity constraint and time effects. Demographic effects reflect predictions of longevity gains and the evolving demographic structure of the population, accounting for changes in health status. See (Lorenzoni et al., 2019[65]) for more details and alternative scenarios.

Source: Lorenzoni et al. (2019[65]), "Health Spending Projections to 2030: New results based on a revised OECD methodology", *OECD Health Working Papers*, https://doi.org/10.1787/5667f23d-en.

StatLink https://doi.org/10.1787/888934245937

Governments face today more than ever further pressure to enhance the management of public investments in a context of tight public budgets, which will make the efficiency of the public investment a cornerstone of the recovery from the crisis (OECD, 2020[19]). Under increasing expenditures on social and health care provision, how can governments maintain and improve access to key public services across their territories, particularly those that are more remote and sparsely populated? What levels of public services should be expected in rural areas? Should these levels be different from those provided in urban contexts? In some places, should services be withdrawn or regionalised (i.e. moved to larger centres)? This report addresses these and other questions by focusing on the effect of geography and population change on the cost of providing services.

Is the provision of services more expensive in lower density and remote areas? Research on the magnitude of differences in service delivery costs due to sparsity, rurality and remoteness is scarce. An existing study for the United Kingdom (DCLG/DEFRA, 2014[66]) found sparsity (used as a proxy to rurality) to be positively and significantly related to unit costs in 11 cases, including waste collection and winter services, among the 51 local authority service expenditure groups examined. In other 15 services including public transport and libraries,[5] sparsity was significantly and negatively associated with unit costs. In the remaining 25 cases, the study did not find a statistically significant effect of sparsity on unit costs. The main themes which rural authorities associated with additional costs were: communicating/engaging with large numbers of communities and neighbourhoods; lack of "clusters" for commissioning purposes; lack of broadband availability/connectivity; increased travel time and costs due to geographical area and transport networks; supply and market factors; and greater numbers of contact/access/delivery points being required.

Analysis of public expenditures on social services in Finland and Sweden indicate that the nature of topography and settlement patterns also play a role. Service delivery costs in Finland are higher than that of Sweden due to the more dispersed settlement network in its northern territories and mountainous terrain. While Sweden also has large northern territories, rural settlements tend to be denser in configuration, thus reducing some of the costs associated with service provision and facilitating service colocation (OECD, 2017[4]). However, even in sparsely populated territories, school closures are not necessarily accompanied by cost savings: evidence for Finland shows the number of schools declined by roughly 7% in 2011-18 occurred while average costs per pupil grew by the same percentage (Lehtonen, 2021[27]).

The right scale of provision and the need for an intermediary scale

What is the right scale to deliver public services? While this question is central to debates regarding centralisation versus decentralisation, there is a great deal of nuance in terms of how scale is interpreted. Considerations include: how a geography is functionally connected; the characteristics of the service being provided and the population being served and; the regulatory environment that may influence service location and provision.

Accessibility is a key consideration for determining the right scale for services. Geographic information systems have been used since the 1970s to map and understand these dynamics (Higgs, 2004[67]). A growth of spatial data (e.g. detailed travel time data) alongside digital records has been used to develop models of access. For example, GIS has been used to examine the accessibility of health care services both in terms of their geographic location and the characteristics of usage of the population being served. By this measure, one can gauge the distances that individuals are prepared or required to travel in order to access different types of services and whether distance impacts health care consumption and health care outcomes by different kinds of groups or socioeconomic characteristics. Geography is one consideration of access. Others include availability, accommodation, affordability and acceptability of the fit between service and population being served.

Regulatory requirements also determine scale. For example, in England, school bus services are paid for by a local government authority (via a national government agency) in order to fulfil their duty under national legislation to facilitate access to school for children who live more than 3 miles from their school (Gristy, 2019[68]).

In recent decades there has been a growth of intermediary institutions across the OECD – that is, forms of service provision that exist below the regional scale but above the local one. Special purpose bodies for transportation and transit services are one such example. Here the logic for the right scale of the service is determined by how the area is functionally connected e.g. the areas across which people live, work and commute. There are economies of scale to be gained where one service provider can deliver across the functionally-connected territory. These types of institutions are most common in metropolitan areas, connecting the city to the suburbs, but less so in rural ones. They can take a variety of forms: public bodies, public entities, regional co-ordinating bodies, transport associations, public benefit corporations, intercommunal authorities or regional transportation partnerships.

The intermediary scale makes sense for transportation and transit planning because the service being delivered is a network. But what of point services such as education and health care? The types of services and the characteristics of the population are an important consideration. For example, it may not be appropriate for young children to have to travel long distances in order to access education, but be possible for older students. As such, education provision in many countries is scaled such that younger cohorts attend smaller neighbourhood schools but high school is provided at a larger scale.

One unique and emerging scale for public services is cross-border services. It can be extremely challenging to provide certain services across borders even where they are functionally closely connected or where economies of scale would make that the logical and most cost-effective choice. With free movement between borders, EU countries have spearheaded such co-ordination. The EU's Directive No. 2011/24—which stipulates that EU citizens have the right to access healthcare in any EU country and to be reimbursed for care abroad by their home country—has raised this issue on the policy agenda. This directive, combined with a number of EU financial instruments to promote border-region projects alongside facilitating legal frameworks to enhance collaboration promoted the cross-border services agenda. However, despite these incentives, a study on the desirability and feasibility of cross-border hospital collaboration in Europe notes that such collaboration encounters a number of impediments such as the challenge of navigating distinct regulatory regimes (Glinos and Baeten, 2014[69]).

Integrated spatial planning

The relationship between provision and geography implies a need to consider the location of services that are important to the daily life of residents together with settlement patterns, demographic change, and transportation and infrastructure planning. Doing so can help governments and communities plan for the future by, for example, mapping and anticipating social and economic trends and adapting needs accordingly. It can also help to identify vulnerable populations and environmental risks (e.g. flooding and climate change) (Manuel et al., 2015[70]).

In the planning literature, integrated spatial planning has arisen as a best practice to manage these and other concerns. It stems from the recognition that effective spatial management is connected to a broader range of considerations such as economic and social development and wellbeing and that sectoral policies have spatial dimensions that need to be co-ordinated e.g. the location of services and transportation infrastructure. This approach is operationalised by strategic documents across functional areas that set out scenarios and medium to long-term goals. In doing so, it can serve as a useful strategy to encourage joint investments between communities and to co-ordinate transportation and infrastructure planning. In rural and remote places, the feasibility to conduct integrated spatial plans often falls to the functional scale to co-ordinate across multiple local actors.

Geographic information systems can help identify spatial disparities in terms of access to public services and propose optimal service relocation options as part of integrated strategies. For instance, a recent project focusing on Denmark, Finland, Iceland, Norway, and Sweden determines the optimal locations of different public and private services in relation to the spatial distribution of the population (Nordregio, 2019[71]).

This report

This report summarises the results of a project that aimed at estimating the costs of schooling and health care services at different geographical scales including the degree of urbanisation (Dijkstra and Poelman, 2014[72]) and TL3 levels. To this aim, work was carried out to simulate the location of services in each country by choosing and estimating an appropriate optimisation framework for potential access at a fine geographical level. This step was followed by calculations of the cost of provision at the grid-cell level, and processing and analysing comparative cost of service provision by degree of urbanisation, regional and country levels. The project also considered estimates of future costs of service provision-based population projections and road network plans. This involved projecting the future cost of service delivery under different scenarios of population change based on current demographic and urbanisation projections up to 2035. The analysis identifies types of settlements, regions and countries facing high service costs and distances and high risk of future under-provision.

Besides this introduction, the report contains 4 chapters. Chapters 2 and 3 are dedicated to school services and Chapter 4 and 5 to health services, with Chapters 2 and 4 outlining in detail the methodology for the estimation of cost and access and Chapters 3 and 5 presenting the results of the application of the method to EU27+UK countries.

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Notes

[1] Comparative typologies or classifications of services are challenged by the different nomenclature and public service organisation across countries (Wollmann and Marcou, 2010[73]).

[2] A definition of public services by Wolmann et al. speaks to this spectrum: “a service can be considered public service if a public authority controls the supply of that service to citizens (or legal subjects) in terms of its substance, accessibility and sometimes quality” (Wollmann, Koprić and Marcou, 2016[74]).

[3] Based on preliminary life expectancy data for Europe available at https://ec.europa.eu/eurostat/databrowser/bookmark/eb24a8d3-8cc6-483a-b320-b7b0f55064f9?lang=en.

[4] Other services considered included gas, electricity, telecommunication infrastructure and labour market services.

[5] Other services in this category include open spaces; traffic management and road safety; community fire safety; street cleansing; housing strategy; advice; advances; and culture and heritage.