

Reconceptualising 'old age' for better regional health policy in Europe

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ABSTRACT

Background

In classical measures of population ageing, 60 or 65 is taken to be the 'boundary' to old age. However, various studies have argued that this 'fixed' boundary to 'old age' which is based upon 'chronological age' can be misleading. Rather than measuring age 'chronologically' (i.e. from birth), age could be better measured 'prospectively', as in how many years of remaining life expectancy a person has. We calculate an alternative measure of ageing for European NUTS-2 regions based upon fixing the 'boundary' to old age at the point in which the population has a remaining life expectancy of 15 years [RLE=15].

Methods

The age at which RLE=15 is calculated for all NUTS-2 regions of the EU28, candidate countries, Switzerland and Norway using life tables provided by Eurostat.

Results

Rather than a 'fixed boundary' to old age at 65 across Europe, our alternative 'threshold' reveals a wide heterogeneity both between and within countries. Across the EU28, the male old-age threshold at the NUTS-2 level ranges from 62.4 to 73.3; while for females the range is between 67.7 and 76.4. Within the UK the male old-age threshold ranges from 67.3 to 73.1. Other regional patterns are discussed and explored.

Conclusion

We provide an alternative conceptual framework for the definition of population ageing. Applied to European regions, they present a more rational and realistic view of ageing which, in turn, can inform better policy making. They also demonstrate the extent to which mortality (and health) inequalities prevail across the regions of Europe.

Introduction

In classical measures of population ageing, 60 or 65 is taken to be the 'boundary' to old age [1]. Various policy and planning frameworks relating to epidemiology and community health are, in turn, based upon this specification of an 'old age' population. The European Commission's *Healthy Ageing* framework, for example, variously considered 'old' to be either above 60 or 65 [2]. Similarly, the World Health Organisation's European Office website on 'Healthy Ageing' uses 65 years as a threshold, with a further threshold at 85 [3].

However, various studies [4–7] have argued that this 'fixed' boundary to 'old age' which is based upon 'chronological age' can be misleading. The revolution in life expectancy means that a 65-year old in 1950 simply cannot be considered as 'the same' as a 65-year old today (or indeed in the future) in terms of their health, activity status, but also their broader human capital and, for example, capability to engage in active ageing programs [8]. Similarly, a 65-year old in a country with very high life expectancy (and health levels) such as Japan or Italy cannot be considered to be 'the same' as a 65-year old in a country with very high mortality - Sierra Leone to take an extreme example [9]. Yet, still, traditional measures of ageing consider all those 65 (or 60) years old and above as 'old.' (In principle, of course, the same notion applies to any fixed chronological age, such as 80 or 85).

In response to this, various studies have proposed an alternative way to conceptualise ageing [7,10]. Rather than measuring age 'chronologically' (i.e. from birth), age could be better measured 'prospectively', as in how many years of remaining life expectancy a person has. By fixing the 'boundary to old age' at a given remaining life expectancy, we have a more rational measure of 'older age' which is responsive to both changes and differences in life expectancy. It has been suggested that fixing remaining life expectancy at 15 years [termed RLE_{15}] may be appropriate as a 'boundary' given that this was the remaining life expectancy at age 65 when many European pension and social welfare systems were designed in the mid-twentieth century [6,11].

Of course, significant inequalities exist in the processes of ageing at the micro-level. Biological differences in both survivorship to older age [12] and morbidity [13] are, in turn, grounded in socioeconomic [14] and gendered [15] interactions which can be traced across the whole life-course [16]. These inequalities clearly inform the need for targeted and differentiated policies to tackle them. Understanding differentials in the thresholds to old age can also be a simple, yet important means of understanding the *spatial* inequalities in the processes of ageing - in this case in the European Union [EU].

When fixing the 'boundary to old age' at RLE_{15} , rather than a static one at age 65, we can see that the age at which we might define 'old' not only varies widely across Europe, but also changes over time. Within the EU for the period 2010-15, for example, the male 'old age threshold' where RLE is 15 years ranges from 62.4 in Latvia to 70.4 in France [17]. For women, meanwhile, the same 'threshold' ranges from 67.9 in Bulgaria

to 74.5, again in France. When we add in a temporal dimension, we can see that the threshold for Latvian and Spanish men is forecast to rise to 67.5 and 74.3 respectively; while for Bulgarian and French women the threshold is forecast to rise to 70.7 and 77.7 respectively. These more realistic 'thresholds' to age can - and have - been translated into various other measures, including more sophisticated 'dependency ratios' [4,18]. In turn, they can also help to present a more realistic view of the challenge and the scale of the 'ageing' population in Europe to practitioners in public and community health.

So far, while these prospective measures of ageing have been published for all countries of the world [17], relatively little attention has been paid to sub-national differences. This is unusual for two reasons. Firstly, numerous studies have identified strong sub-national differentials in both traditional [19] and alternative measures of ageing [20]. Secondly, a large literature exists on sub-national differentials in both health and access to healthcare [21–24]. Finally, in many settings, the sub-national unit is a more appropriate level of policy formation when dealing with issues relating to older-age. This is especially the case in federal government, but also in the case of planning for healthcare systems.

In studies of regional differences in the EU, it is common to sub-divide countries into their respective 'NUTS-2' regions. These are described by the EU as the 'basic regions for the application of regional policies' [25]. A recent study of ageing in Europe at the sub-national level [19], for example, compared support ratios at the NUTS-2 level.

However, this study relied upon traditional indicators of ageing, with 65 being taken as a 'threshold to old age'.

In this study, then, we produce new estimates of the dynamically changing 'old age threshold' given as the age at which $RLE=15$ years for all NUTS-2 regions of Europe. In doing so, we are able to both explore in more depth the regional inequalities of health across Europe in a novel way, but also to represent a more rational and realistic view of what 'old age' actually is in Europe, and how it differs across time and space.

Methods

In this paper, we calculate the 'old age threshold' for men and women for 2017 for all NUTS-2 regions of the European Union countries as of March 2019 (i.e. the EU-28). We also calculate the 'old age threshold' for the regions of the candidate countries (Albania, the Republic of North Macedonia, Montenegro, Serbia and Turkey), Switzerland and Norway for indicative comparison in the maps only. This is the age at which remaining life expectancy first falls below 15 years. In order to do so, we use life tables for all EU NUTS-2 regions as produced by Eurostat [26], utilising in particular the *eurostat* R package.

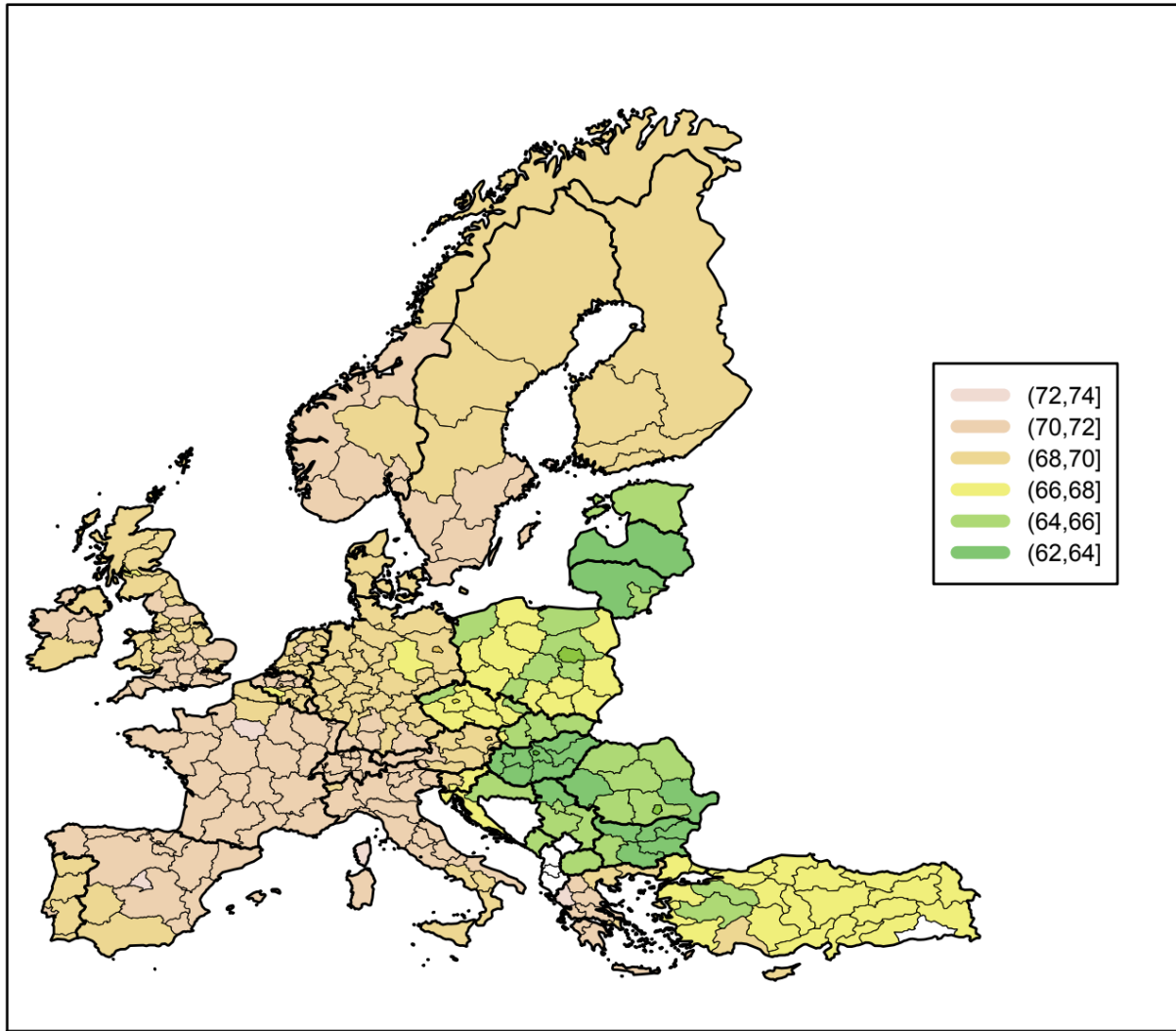
Note that in some cases, the NUTS-2 region is, in effect, the same territorial unit as higher order areas such as NUTS-1 or even the country itself. NUTS-2 is the same unit as the country in Albania, Cyprus, Estonia, Lithuania, Malta, Montenegro and the

Republic of North Macedonia, for example. Finally, also note that for some policies and some countries, it may be that an alternative territorial unit may be more suitable. (For example, in Germany the *Länder* are more often categorised as NUTS-1). However, for the sake of consistency we employ only NUTS-2. Robustness of life tables were checked against total regional populations, which are reproduced for inspection in Supplementary Information Table 3.

Results

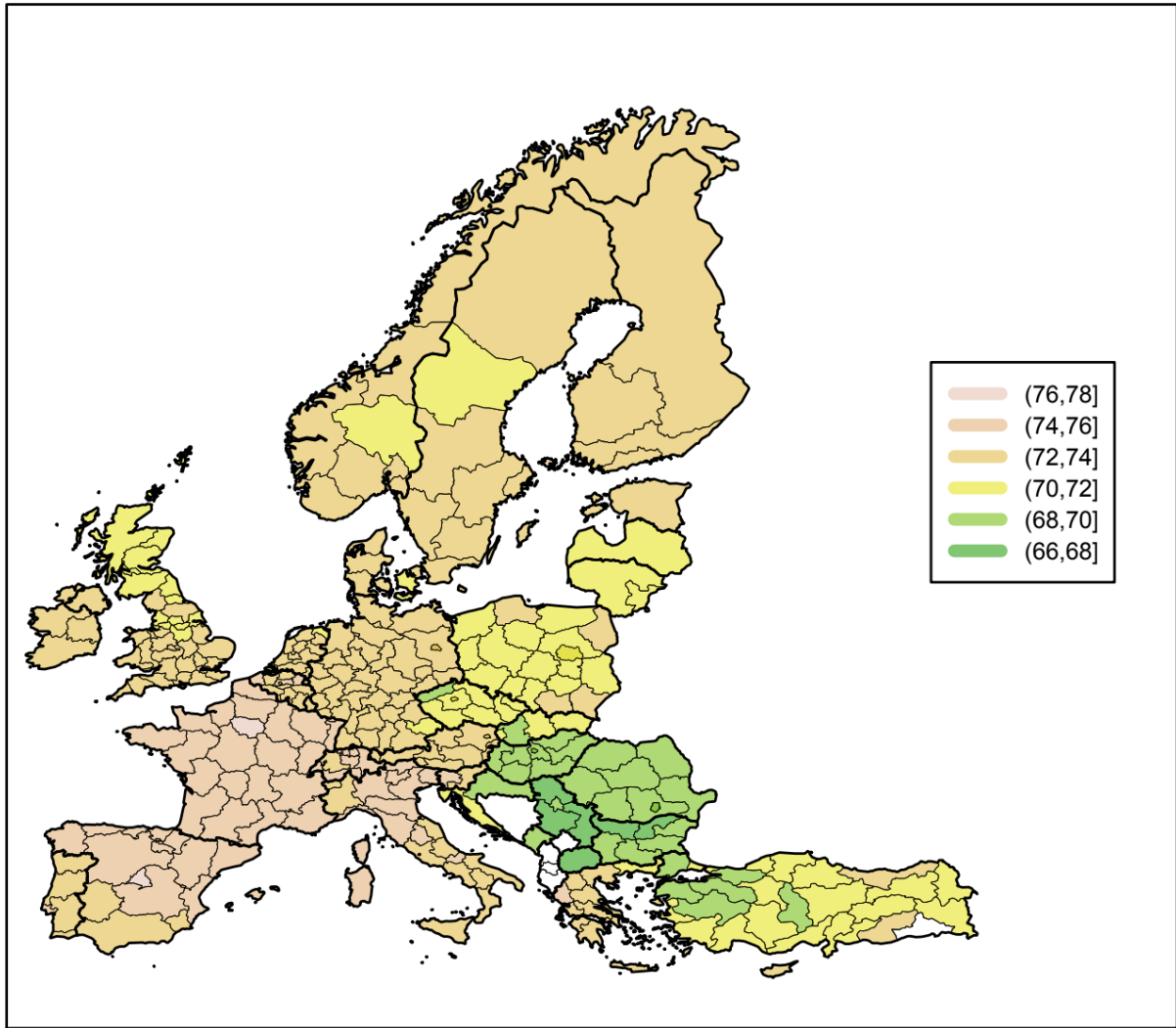
The full results of the exercise can be found in Supplementary Information Tables 1-2, with the total population for each region shown for reference in Supplementary Information Table 3. Maps for male and female old-age threshold can be found in Figures 1 and 2.

Figure 1: Old-age threshold (age where RLE=15 years), EU28 NUTS-2 regions, candidate countries, Norway and Switzerland, 2017, males



Source: authors calculations based upon [26]

Figure 2: Old-age threshold (age where RLE=15 years), EU28 NUTS-2 regions, candidate countries, Norway and Switzerland, 2017, females



Source: authors calculations based upon [26]

At the macro-level, we see some familiar and expected patterns. Higher levels of mortality amongst Eastern European males [27] are clearly reflected in Figure 1 which shows their threshold to older age. Women in Romania, Bulgaria, Hungary, Albania, and the Republic of North Macedonia are characterised by younger 'old-age thresholds'. Also for females, the Baltic Republics, Czechia and Poland represent something of a

‘middle ground’ between Eastern and Western Europe. All of these are familiar from national level studies of mortality, ageing or prospective ageing.

These figures also allow us to consider the range of (and therefore inequalities in) of old-age thresholds within and between different countries. Comparing across the EU28 and candidate countries, we can see a range at the sub-national level which is greater than the national one. As Table 1 demonstrates, the range between the highest and lowest old-age thresholds at the NUTS-2 level in the EU28 in 2017 is 10.9 years for males and 8.7 years for females.

Table 1: EU28 NUTS-2 Regions with highest and lowest ‘old-age thresholds’ (defined as age at which remaining life expectancy is equal to 15 years).

	Males			Females		
	Code	Name	Boundary to old-age	Code	Name	Boundary to old-age
Lowest five	HU31	Észak-Magyarország	62.4	BG31	Severozapaden	67.7
	BG31	Severozapaden	62.7	BG32	Severen tsentralen	67.9
	BG32	Severen tsentralen	62.8	RO42	Vest	68.3
	BG34	Yugoiztochen	63.2	BG33	Severoiztochen	68.4
	BG33	Severoiztochen	63.2	BG34	Yugoiztochen	68.5
Highest five	UKI7	Outer London (W/NW)	72.3	ES21	País Vasco	75.8

	FR10	Ile-de-France	72.7	ES41	Castilla y León	76.0
	FI20	Åland*	73.0	FRM0	Corse	76.0
	UKI3	Inner London (W)	73.1	ES30	Comunidad de Madrid	76.3
	FRM0	Corse	73.3	FR10	Ile-de-France	76.4

Source: Authors calculations

Notes: BGx=Bulgaria, ESx=Spain, FRx=France, FIx=Finland, HUX=Hungary, ROx=Romania, UKx=United Kingdom

* The population of the Åland region is relatively small (29,204) so this figure should be seen as provisional owing to the instability the life table.

At the sub-national level, some countries such as Hungary and Switzerland are remarkably homogeneous. Others appear to have pronounced binary differences, such as Adriatic versus inland Croatia; Île-de-France versus the rest of France or Bucharest versus the rest of Romania. Yet these are not always consistent across genders. Consider, for example, the old-age threshold among females in the UK which is noticeable lower in Scotland and northern England. For males in the UK, the old-age threshold is more spatially heterogeneous.

We can also consider the range of in-country differences in old-age thresholds. The UK is somewhat extreme in this case: the old-age threshold is 67.3 in West-Central Scotland, compared to 73.1 for males in Inner London West. In Germany, meanwhile the range is somewhat narrower: for males in Sachsen-Anhalt, the old-age threshold is 67.8, compared to 70.7 in Oberbayern.

Some countries appear particularly intriguing in terms of their heterogeneity. While perhaps unsurprising, the difference in old-age threshold within Turkey is certainly striking. In Poland, meanwhile, there is very strong heterogeneity, especially among males.

Conclusions

Population is held up to be one of the great challenges to healthcare provision, social policy and the economy in the twentieth-century. However, despite the enormity which is attached to this challenge, the phenomenon is remarkably ill-conceptualised.

Traditional measures of ageing are based upon static, outdated measures which neither take into account changes (and differences) in life expectancy, nor map onto existing institutional systems. New methods of conceptualising and, in turn, measuring ageing based upon prospective measures can represent both a more rational and realistic means of depicting the true nature of ageing in Europe and beyond. For sure, the number of people aged 65 (or any given chronological age) and over is important in certain very narrow contexts - such as when entitlement to a given social benefit it met. However, from the perspective of holistic approach to understanding the general demand for services relating to ageing populations, and how these may change over time, defining the population based upon a dynamic, prospective measure is, we argue, more helpful.

Recognising that inequalities in health and mortality result in differentials in ageing across time and space, in this paper we sought to build upon existing nationally derived prospective measures of ageing in order to produce the first sub-national (NUTS-2 level) indicators of the threshold to old-age for the EU28 and the EU candidate countries. Our results showed that, by considering the sub-national unit of analysis, we can get a much more nuanced perspective on the thresholds to old-age across the EU28 and candidate countries. We have identified not only a great range of inequalities relating to ageing *across* countries, but also *within* them. Patterns which would be hidden when considering at the national level are brought into sharp relief. In some cases there is a wide range of thresholds, in others a dichotomy, while others exhibit remarkable homogeneity. Each of these circumstances can help inform policy making regarding the demand for particular services relating to those in 'old age'.

There are a number of limitations to this study. Firstly, while the NUTS-2 territorial unit is a (relatively) comparable unit 'for the application of regional policies' [25], in many cases it may not be the most appropriate unit of analysis for policies relating to ageing. Indeed, in some cases - such as the UK for example - the NUTS-2 regions are entirely synthetic and do not map onto any policymaking authority whatsoever. Secondly, we recognise that our justification for defining a 'boundary to old-age' as the age at which $RLE=15$ years - and indeed for holding this constant - can be challenged. Thirdly, we have not explored in depth *why* such inequalities exist in different regions. This would require an in-depth exploration of myriad policies and contexts at a series of sub-national levels across more than thirty countries, for which space does not permit here. Fourthly, we

have only presented a snapshot of one year, 2017. Ideally, we would have produced figures for how the threshold to old-age has changed from the past to the present, and also forecasts for the future. However, projected NUTS-2 life tables have not been published by Eurostat; and NUTS-2 borders have not been stable over time, which means that historical comparison is not possible. Finally, while we consider spatial inequalities in this paper, we recognise that these inequalities in the ageing process need to be understood in terms of their own socioeconomic and health contexts. In this vein, developing work on understanding a more individualised, 'characteristics approach' to measuring ageing will yield further results [28].

Despite these limitations, we firmly believe that the use of 65 (or, indeed, any other chronologically defined age) as a fixed, static boundary to old-age is irrational and misleading in most circumstances relating to public and community health. It can lead to a misleading view of the scale and scope of population ageing and can, in turn, misinform policy formulation. Our proposed conceptual framework of a 'prospective ageing' takes a more rational and realistic view of ageing which takes into account the not only the revolution in life expectancy over the past decades, but also the differentials across space. By studying differences of this new old-age threshold at the regional level for the first time, we not only demonstrate a more nuanced and realistic view of population ageing across Europe, but also represent the level of health inequalities across the continent which would have otherwise remained hidden when considering at the national level.

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SI Table 1: Old-age threshold (age where RLE=15 years), EU28 NUTS-2 regions, 2017, males

Code	Full Name	Old-age threshold (age where RLE=15 years)
HU31	Észak-Magyarország	62.387
BG31	Severozapaden	62.666
BG32	Severen tsentralen	62.818
BG34	Yugoiztochen	63.170
BG33	Severoiztochen	63.170
LV00	Latvija	63.317
HU21	Közép-Dunántúl	63.334
BG42	Yuzhen tsentralen	63.489
RO42	Vest	63.519
HU32	Észak-Alföld	63.665
HU33	Dél-Alföld	63.666
HU12	Pest	63.686
HU23	Dél-Dunántúl	63.819
LT02	Vidurio ir vakaru Lietuvos regionas	63.832
HU22	Nyugat-Dunántúl	64.000
RO22	Sud-Est	64.000
RO31	Sud - Muntenia	64.296
RO11	Nord-Vest	64.333
BG41	Yugozapaden	64.511
RO21	Nord-Est	64.690
LT01	Sostines regionas	64.807
SK03	Stredné Slovensko	64.853
RO12	Centru	65.000
RO32	Bucuresti - Ilfov	65.000
HR04	Kontinentalna Hrvatska	65.151
SK02	Západné Slovensko	65.164
PL71	Lódzkie	65.167
RO41	Sud-Vest Oltenia	65.332
PL92	Mazowiecki regionalny	65.332
CZ04	Severozápad	65.348
PL62	Warminsko-Mazurskie	65.520
PL42	Zachodniopomorskie	65.663
CZ08	Moravskoslezsko	65.698

SK04	Východné Slovensko	65.708
PT20	Região Autónoma dos Açores (PT)	65.719
EE00	Eesti	65.851
PL52	Opolskie	66.000
PL51	Dolnoslaskie	66.168
PL22	Slaskie	66.168
PT30	Região Autónoma da Madeira (PT)	66.192
PL41	Wielkopolskie	66.291
SK01	Bratislavský kraj	66.318
CZ02	Střední Čechy	66.329
PL81	Lubelskie	66.332
PL61	Kujawsko-Pomorskie	66.342
PL43	Lubuskie	66.359
FRY5	Mayotte	66.497
PL72	Świętokrzyskie	66.665
CZ07	Střední Morava	66.695
CZ03	Jihozápad	66.713
HU11	Budapest	66.835
CZ06	Jihovýchod	67.000
HR03	Jadranska Hrvatska	67.000
PL63	Pomorskie	67.000
PL84	Podlaskie	67.000
CZ05	Severovýchod	67.139
UKM8	West Central Scotland	67.285
SI03	Vzhodna Slovenija	67.501
PL21	Małopolskie	67.504
PL82	Podkarpackie	67.552
BE32	Prov. Hainaut	67.831
DEE0	Sachsen-Anhalt	67.844
BE33	Prov. Liège	68.329
DEA5	Arnsberg	68.413
PL91	Warszawski stołeczny	68.501
CZ01	Praha	68.552
DE24	Oberfranken	68.580
BE35	Prov. Namur	68.652
DE50	Bremen	68.669
DE72	Gießen	68.689
PT18	Alentejo	68.706
PT15	Algarve	68.732
DE22	Niederbayern	68.733
UKM9	Southern Scotland	68.747

DEG0	Thüringen	68.841
DEA3	Münster	68.845
DE94	Weser-Ems	68.857
DK01	Hovedstaden	68.858
DEB1	Koblenz	68.860
DED4	Chemnitz	68.860
UKM5	North Eastern Scotland	68.867
DK02	Sjælland	68.870
AT11	Burgenland (AT)	69.000
BE10	Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest	69.000
DE25	Mittelfranken	69.000
DE73	Kassel	69.000
DE80	Mecklenburg-Vorpommern	69.000
DE91	Braunschweig	69.000
DE93	Lüneburg	69.000
DEA1	Düsseldorf	69.000
DEB2	Trier	69.000
ES63	Ciudad Autónoma de Ceuta (ES)	69.000
FRY3	Guyane	69.000
ITF3	Campania	69.000
NL11	Groningen	69.000
UKD3	Greater Manchester	69.000
UKM7	Eastern Scotland	69.000
UKD4	Lancashire	69.135
UKE3	South Yorkshire	69.136
DEB3	Rheinhessen-Pfalz	69.137
DEF0	Schleswig-Holstein	69.138
DE23	Oberpfalz	69.143
UKD7	Merseyside	69.143
DE92	Hannover	69.144
UKE4	West Yorkshire	69.144
BE34	Prov. Luxembourg (BE)	69.158
UKC1	Tees Valley and Durham	69.242
UKE1	East Yorkshire and Northern Lincolnshire	69.253
SE32	Mellersta Norrland	69.257
UKL1	West Wales and The Valleys	69.262
DEA2	Köln	69.274
EL51	Anatoliki Makedonia, Thraki	69.277
ITG1	Sicilia	69.280
NL21	Overijssel	69.288

PT16	Centro (PT)	69.289
DED5	Leipzig	69.325
DE40	Brandenburg	69.329
AT13	Wien	69.331
EL30	Attiki	69.341
UKC2	Northumberland and Tyne and Wear	69.378
DE26	Unterfranken	69.411
UKG3	West Midlands	69.429
UKN0	Northern Ireland (UK)	69.443
DE60	Hamburg	69.504
FRE1	Nord-Pas de Calais	69.505
UKF1	Derbyshire and Nottinghamshire	69.573
PT11	Norte	69.573
DK03	Syddanmark	69.574
CY00	Kypros	69.576
DEA4	Detmold	69.587
FI1D	Pohjois- ja Itä-Suomi	69.590
FI19	Länsi-Suomi	69.627
AT21	Kärnten	69.674
NL22	Gelderland	69.710
DE12	Karlsruhe	69.715
AT22	Steiermark	69.715
NL13	Drenthe	69.716
FI1C	Etelä-Suomi	69.716
ES61	Andalucía	69.717
NL41	Noord-Brabant	69.721
NL42	Limburg (NL)	69.721
AT12	Niederösterreich	69.727
DK04	Midtjylland	69.747
SI04	Zahodna Slovenija	69.853
EL62	Ionia Nisia	69.854
AT31	Oberösterreich	69.858
DE71	Darmstadt	69.858
NL12	Friesland (NL)	69.864
BE31	Prov. Brabant Wallon	69.865
UKF3	Lincolnshire	69.866
IE05	Southern	69.868
ITC2	Valle d'Aosta/Vallée d'Aoste	69.871
DED2	Dresden	69.878
DE27	Schwaben	70.000
DE30	Berlin	70.000

DK05	Nordjylland	70.000
EL41	Voreio Aigaio	70.000
EL52	Kentriki Makedonia	70.000
ES43	Extremadura	70.000
FI1B	Helsinki-Uusimaa	70.000
FRE2	Picardie	70.000
ITF5	Basilicata	70.000
ITF6	Calabria	70.000
NL31	Utrecht	70.000
NL32	Noord-Holland	70.000
NL33	Zuid-Holland	70.000
SE31	Norra Mellansverige	70.000
SE33	Övre Norrland	70.000
UKG2	Shropshire and Staffordshire	70.000
UKH3	Essex	70.000
UKL2	East Wales	70.000
UKM6	Highlands and Islands	70.000
ES62	Región de Murcia	70.129
UKF2	Leicestershire, Rutland and Northamptonshire	70.134
DE13	Freiburg	70.134
IE04	Northern and Western	70.136
DE11	Stuttgart	70.143
BE21	Prov. Antwerpen	70.145
PT17	Área Metropolitana de Lisboa	70.145
IE06	Eastern and Midland	70.255
EL43	Kriti	70.256
ITF2	Molise	70.270
BE23	Prov. Oost-Vlaanderen	70.273
UKI4	Inner London - East	70.275
SE12	Östra Mellansverige	70.275
UKD1	Cumbria	70.277
SE23	Västsverige	70.284
UKG1	Herefordshire, Worcestershire and Warwickshire	70.285
ES12	Principado de Asturias	70.285
FRF3	Lorraine	70.286
MT00	Malta	70.288
UKJ4	Kent	70.288
FRY4	La Réunion	70.325
DE14	Tübingen	70.329
LU00	Luxembourg	70.342
ITC3	Liguria	70.382

ITC1	Piemonte	70.383
UKI5	Outer London - East and North East	70.427
UKK3	Cornwall and Isles of Scilly	70.431
SE21	Småland med öarna	70.431
FRD2	Haute-Normandie	70.433
FRF2	Champagne-Ardenne	70.434
SE22	Sydsverige	70.434
ITI4	Lazio	70.441
ES64	Ciudad Autónoma de Melilla (ES)	70.471
ES52	Comunidad Valenciana	70.499
ITF1	Abruzzo	70.502
ITH4	Friuli-Venezia Giulia	70.503
ITF4	Puglia	70.503
EL42	Notio Aigaio	70.507
NL23	Flevoland	70.508
FRC1	Bourgogne	70.561
EL61	Thessalia	70.570
FRK1	Auvergne	70.571
UKK4	Devon	70.572
EL63	Dytiki Ellada	70.576
EL53	Dytiki Makedonia	70.586
NL34	Zeeland	70.587
UKE2	North Yorkshire	70.618
UKK1	Gloucestershire, Wiltshire and Bristol/Bath area	70.624
ES13	Cantabria	70.625
BE24	Prov. Vlaams-Brabant	70.625
AT32	Salzburg	70.680
AT34	Vorarlberg	70.700
DE21	Oberbayern	70.714
FRF1	Alsace	70.716
UKD6	Cheshire	70.719
ITI1	Toscana	70.735
ITH5	Emilia-Romagna	70.738
SE11	Stockholm	70.746
UKH2	Bedfordshire and Hertfordshire	70.761
EL64	Sterea Ellada	70.837
ITG2	Sardegna	70.850
ES51	Cataluña	70.853
ES42	Castilla-la Mancha	70.857
EL65	Peloponnisos	70.859
ITC4	Lombardia	70.863

ITH3	Veneto	70.863
ITI3	Marche	70.865
ES24	Aragón	70.865
ES53	Illes Balears	70.867
UKJ3	Hampshire and Isle of Wight	70.871
FRH0	Bretagne	70.874
BE22	Prov. Limburg (BE)	70.876
ITI2	Umbria	70.878
BE25	Prov. West-Vlaanderen	71.000
ES21	País Vasco	71.000
ES22	Comunidad Foral de Navarra	71.000
UKH1	East Anglia	71.000
UKJ2	Surrey, East and West Sussex	71.000
UKK2	Dorset and Somerset	71.141
AT33	Tirol	71.145
FRI2	Limousin	71.145
UKJ1	Berkshire, Buckinghamshire and Oxfordshire	71.259
FRB0	Centre - Val de Loire	71.284
ES11	Galicia	71.285
FRC2	Franche-Comté	71.288
FRD1	Basse-Normandie	71.335
UKI6	Outer London - South	71.381
ES70	Canarias (ES)	71.432
ITH2	Provincia Autonoma di Trento	71.436
FRJ1	Languedoc-Roussillon	71.491
FRI1	Aquitaine	71.497
FRI3	Poitou-Charentes	71.501
FRG0	Pays de la Loire	71.589
ES41	Castilla y León	71.707
FRL0	Provence-Alpes-Côte d'Azur	71.709
ES23	La Rioja	71.715
FRJ2	Midi-Pyrénées	71.729
ITH1	Provincia Autonoma di Bolzano/Bozen	71.855
FRK2	Rhône-Alpes	72.000
FRY2	Martinique	72.121
ES30	Comunidad de Madrid	72.145
EL54	Ipeiros	72.258
UKI7	Outer London - West and North West	72.263
FR10	Île de France	72.743
FI20	Åland	73.000
UKI3	Inner London - West	73.138

FRM0	Corse	73.311
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SI Table 2: Old-age threshold (age where RLE=15 years), EU28 NUTS-2 regions, 2017, females

Code	Full Name	Old-age threshold (age where RLE=15 years)
BG31	Severozapaden	67.743
BG32	Severen tsentralen	67.867
RO42	Vest	68.258
BG33	Severoiztochen	68.425
BG34	Yugoiztochen	68.489
RO11	Nord-Vest	68.620
HU31	Észak-Magyarország	68.866
BG42	Yuzhen tsentralen	68.881
HU12	Pest	69.000
BG41	Yugozapaden	69.138
HU21	Közép-Dunántúl	69.282
HU23	Dél-Dunántúl	69.285
RO31	Sud - Muntenia	69.361
HU32	Észak-Alföld	69.415
RO22	Sud-Est	69.426
HR04	Kontinentalna Hrvatska	69.426
HU33	Dél-Alföld	69.429
RO41	Sud-Vest Oltenia	69.442
RO21	Nord-Est	69.587
RO32	Bucuresti - Ilfov	69.611
SK02	Západné Slovensko	69.720
CZ04	Severozápad	69.746
RO12	Centru	69.851
HU22	Nyugat-Dunántúl	70.000
SK03	Stredné Slovensko	70.120
LV00	Latvija	70.274
UKM8	West Central Scotland	70.285
CZ08	Moravskoslezsko	70.576
PT20	Região Autónoma dos Açores (PT)	70.602
SK04	Východné Slovensko	70.608
LT02	Vidurio ir vakaru Lietuvos regionas	70.624
HU11	Budapest	70.716
CZ02	Střední Čechy	70.863
CZ03	Jihozápad	70.869
HR03	Jadranska Hrvatska	70.874

LT01	Sostines regionas	71.000
SK01	Bratislavský kraj	71.000
UKM9	Southern Scotland	71.000
CZ05	Severovýchod	71.122
CZ07	Střední Morava	71.123
PT30	Região Autónoma da Madeira (PT)	71.246
PL22	Slaskie	71.285
PL52	Opolskie	71.291
PL71	Lódzkie	71.376
UKD3	Greater Manchester	71.381
UKC2	Northumberland and Tyne and Wear	71.428
UKC1	Tees Valley and Durham	71.430
PL43	Lubuskie	71.597
UKM7	Eastern Scotland	71.612
UKD4	Lancashire	71.612
EL62	Ionía Nisia	71.624
PL92	Mazowiecki regionalny	71.625
EL51	Anatolíki Makedonia, Thraki	71.625
CZ06	Jihovýchod	71.630
DK02	Sjælland	71.663
PL62	Warmińsko-Mazurskie	71.707
PL61	Kujawsko-Pomorskie	71.717
PL41	Wielkopolskie	71.728
PL81	Lubelskie	71.737
UKM5	North Eastern Scotland	71.744
NL11	Groningen	71.754
ES64	Ciudad Autónoma de Melilla (ES)	71.861
CZ01	Praha	71.863
UKE4	West Yorkshire	71.863
UKE1	East Yorkshire and Northern Lincolnshire	71.863
PL72	Świętokrzyskie	71.868
UKE3	South Yorkshire	71.871
DE22	Niederbayern	72.000
PL42	Zachodniopomorskie	72.000
PL51	Dolnośląskie	72.000
SE32	Mellersta Norrland	72.000
UKD7	Merseyside	72.000
UKF1	Derbyshire and Nottinghamshire	72.000
UKM6	Highlands and Islands	72.000
DE91	Braunschweig	72.120
DEG0	Thüringen	72.125

UKF3	Lincolnshire	72.126
CY00	Kypros	72.127
DE72	Gießen	72.127
UKL1	West Wales and The Valleys	72.132
UKG2	Shropshire and Staffordshire	72.132
BE33	Prov. Liège	72.136
DK01	Hovedstaden	72.138
SE33	Övre Norrland	72.241
DK04	Midtjylland	72.242
NL12	Friesland (NL)	72.252
SI03	Vzhodna Slovenija	72.254
UKN0	Northern Ireland (UK)	72.258
DEE0	Sachsen-Anhalt	72.266
DE24	Oberfranken	72.266
UKG3	West Midlands	72.271
EE00	Eesti	72.274
PL21	Malopolskie	72.277
DEB1	Koblenz	72.281
DE25	Mittelfranken	72.284
DEF0	Schleswig-Holstein	72.284
PL63	Pomorskie	72.288
UKD1	Cumbria	72.365
ITF3	Campania	72.377
UKH3	Essex	72.378
EL52	Kentriki Makedonia	72.378
DEA5	Arnsberg	72.378
DE93	Lüneburg	72.378
AT13	Wien	72.381
DE23	Oberpfalz	72.390
DEA1	Düsseldorf	72.415
BE32	Prov. Hainaut	72.426
PL82	Podkarpackie	72.426
DE94	Weser-Ems	72.426
AT12	Niederösterreich	72.427
SE31	Norra Mellansverige	72.429
EL63	Dytiki Ellada	72.442
DE26	Unterfranken	72.483
NL41	Noord-Brabant	72.484
NL32	Noord-Holland	72.484
EL30	Attiki	72.485
NL42	Limburg (NL)	72.485

IE05	Southern	72.488
AT11	Burgenland (AT)	72.494
UKD6	Cheshire	72.499
PL91	Warszawski stoleczny	72.564
DK05	Nordjylland	72.571
BE35	Prov. Namur	72.571
DE73	Kassel	72.572
NL22	Gelderland	72.572
DE40	Brandenburg	72.608
DEA3	Münster	72.613
DE92	Hannover	72.620
DEB3	Rheinhessen-Pfalz	72.621
NL33	Zuid-Holland	72.628
ITG1	Sicilia	72.628
DEA2	Köln	72.629
NL23	Flevoland	72.638
NL13	Drenthe	72.641
PT15	Algarve	72.646
UKK3	Cornwall and Isles of Scilly	72.699
DE50	Bremen	72.717
PL84	Podlaskie	72.721
DK03	Syddanmark	72.733
IE06	Eastern and Midland	72.735
DED4	Chemnitz	72.750
EL43	Kriti	72.754
EL65	Peloponnisos	72.768
BE34	Prov. Luxembourg (BE)	72.832
UKL2	East Wales	72.855
DED5	Leipzig	72.861
UKJ4	Kent	72.861
UKF2	Leicestershire, Rutland and Northamptonshire	72.863
DE71	Darmstadt	72.864
UKK1	Gloucestershire, Wiltshire and Bristol/Bath area	72.866
DE12	Karlsruhe	72.866
DE80	Mecklenburg-Vorpommern	72.874
EL64	Sterea Ellada	72.875
SE12	Östra Mellansverige	72.877
SE21	Småland med öarna	72.878
NL21	Overijssel	72.878
EL61	Thessalia	72.886
DE27	Schwaben	73.000

DE30	Berlin	73.000
DEA4	Detmold	73.000
DEB2	Trier	73.000
EL53	Dytiki Makedonia	73.000
NL31	Utrecht	73.000
PT18	Alentejo	73.000
SE22	Sydsverige	73.000
SE23	Västsverige	73.000
UKK4	Devon	73.000
AT22	Steiermark	73.125
EL42	Notio Aigaio	73.127
PT16	Centro (PT)	73.133
DE21	Oberbayern	73.134
AT31	Oberösterreich	73.135
UKG1	Herefordshire, Worcestershire and Warwickshire	73.141
UKH2	Bedfordshire and Hertfordshire	73.142
DE11	Stuttgart	73.241
UKE2	North Yorkshire	73.242
NL34	Zeeland	73.244
DE14	Tübingen	73.249
FI1D	Pohjois- ja Itä-Suomi	73.250
DE13	Freiburg	73.256
DE60	Hamburg	73.259
UKJ3	Hampshire and Isle of Wight	73.284
UKH1	East Anglia	73.287
ITF6	Calabria	73.361
ES61	Andalucía	73.375
DED2	Dresden	73.377
AT21	Kärnten	73.378
UKK2	Dorset and Somerset	73.379
SE11	Stockholm	73.379
UKJ2	Surrey, East and West Sussex	73.433
IE04	Northern and Western	73.445
LU00	Luxembourg	73.486
UKI5	Outer London - East and North East	73.488
PT11	Norte	73.498
ES62	Región de Murcia	73.556
BE21	Prov. Antwerpen	73.561
AT34	Vorarlberg	73.564
BE10	Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest	73.574

ITC2	Valle d'Aosta/Vallée d'Aoste	73.577
ITF1	Abruzzo	73.612
FI1C	Etelä-Suomi	73.630
EL41	Voreio Aigaio	73.635
AT32	Salzburg	73.648
FI19	Länsi-Suomi	73.714
ITF4	Puglia	73.720
MT00	Malta	73.726
AT33	Tirol	73.744
UKI6	Outer London - South	73.753
ITC1	Piemonte	73.755
ITI4	Lazio	73.858
UKJ1	Berkshire, Buckinghamshire and Oxfordshire	73.860
FI1B	Helsinki-Uusimaa	73.868
ES43	Extremadura	73.872
ITI3	Marche	73.875
BE31	Prov. Brabant Wallon	73.881
BE23	Prov. Oost-Vlaanderen	74.000
ITF5	Basilicata	74.000
ES52	Comunidad Valenciana	74.114
EL54	Ipeiros	74.124
ITC3	Liguria	74.125
ITI2	Umbria	74.125
FRE2	Picardie	74.126
ITH5	Emilia-Romagna	74.126
ITF2	Molise	74.126
FRE1	Nord-Pas de Calais	74.135
UKI4	Inner London - East	74.139
ES53	Illes Balears	74.222
PT17	Área Metropolitana de Lisboa	74.244
SI04	Zahodna Slovenija	74.248
ITI1	Toscana	74.250
ES42	Castilla-la Mancha	74.251
ES63	Ciudad Autónoma de Ceuta (ES)	74.261
BE22	Prov. Limburg (BE)	74.271
ITH3	Veneto	74.374
BE24	Prov. Vlaams-Brabant	74.378
ITH4	Friuli-Venezia Giulia	74.379
BE25	Prov. West-Vlaanderen	74.433
UKI7	Outer London - West and North West	74.495
ITC4	Lombardia	74.499

FRY4	La Réunion	74.502
ITG2	Sardegna	74.717
FRF3	Lorraine	74.721
ES70	Canarias (ES)	74.735
FRF2	Champagne-Ardenne	74.743
ES12	Principado de Asturias	74.750
FRK1	Auvergne	74.752
ITH2	Provincia Autonoma di Trento	74.862
FRH0	Bretagne	74.874
ITH1	Provincia Autonoma di Bolzano/Bozen	74.875
ES51	Cataluña	75.000
FI20	Åland	75.000
FRC1	Bourgogne	75.000
FRD2	Haute-Normandie	75.000
FRF1	Alsace	75.000
ES24	Aragón	75.125
FRI2	Limousin	75.139
FRY3	Guyane	75.147
ES11	Galicia	75.249
FRC2	Franche-Comté	75.249
FRI1	Aquitaine	75.281
FRJ1	Languedoc-Roussillon	75.377
FRL0	Provence-Alpes-Côte d'Azur	75.425
FRJ2	Midi-Pyrénées	75.488
FRI3	Poitou-Charentes	75.499
FRD1	Basse-Normandie	75.499
FRB0	Centre - Val de Loire	75.503
ES22	Comunidad Foral de Navarra	75.532
UKI3	Inner London - West	75.576
FRG0	Pays de la Loire	75.609
ES13	Cantabria	75.627
ES23	La Rioja	75.641
FRK2	Rhône-Alpes	75.748
ES21	País Vasco	75.751
ES41	Castilla y León	76.000
FRM0	Corse	76.000
ES30	Comunidad de Madrid	76.323
FR10	Île de France	76.366
FRY2	Martinique	76.616

SI Table 3: EU28 NUTS-2 regions, total population, 2017

Code	Full name	Total population
AT11	Burgenland (AT)	291942
AT12	Niederösterreich	1665753
AT13	Wien	1867582
AT21	Kärnten	561077
AT22	Steiermark	1237298
AT31	Oberösterreich	1465045
AT32	Salzburg	549263
AT33	Tirol	746153
AT34	Vorarlberg	388752
BE10	Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest	1199095
BE21	Prov. Antwerpen	1838863
BE22	Prov. Limburg (BE)	869664
BE23	Prov. Oost-Vlaanderen	1498483
BE24	Prov. Vlaams-Brabant	1130644
BE25	Prov. West-Vlaanderen	1188407
BE31	Prov. Brabant Wallon	399735
BE32	Prov. Hainaut	1342053
BE33	Prov. Liège	1106039
BE34	Prov. Luxembourg (BE)	284617
BE35	Prov. Namur	494127
BG31	Severozapaden	769623
BG32	Severen tsentralen	805441
BG33	Severoiztochen	939262
BG34	Yugoiztochen	1046125
BG41	Yugozapaden	2115344
BG42	Yuzhen tsentralen	1426064
CY00	Kypros	854802
CZ01	Praha	1280508
CZ02	Střední Čechy	1338982
CZ03	Jihozápad	1217411
CZ04	Severozápad	1118126
CZ05	Severovýchod	1508527
CZ06	Jihovýchod	1687764
CZ07	Střední Morava	1217623
CZ08	Moravskoslezsko	1209879
DE11	Stuttgart	4098278
DE12	Karlsruhe	2779314

DE13	Freiburg	2239734
DE14	Tübingen	1834567
DE21	Oberbayern	4633323
DE22	Niederbayern	1219397
DE23	Oberpfalz	1098378
DE24	Oberfranken	1062394
DE25	Mittelfranken	1750059
DE26	Unterfranken	1309209
DE27	Schwaben	1857991
DE30	Berlin	3574830
DE40	Brandenburg	2494648
DE50	Bremen	678753
DE60	Hamburg	1810438
DE71	Darmstadt	3951234
DE72	Gießen	1043643
DE73	Kassel	1218211
DE80	Mecklenburg-Vorpommern	1610674
DE91	Braunschweig	1595609
DE92	Hannover	2139976
DE93	Lüneburg	1703945
DE94	Weser-Ems	2506155
DEA1	Düsseldorf	5190790
DEA2	Köln	4439416
DEA3	Münster	2619376
DEA4	Detmold	2054205
DEA5	Arnsberg	3586313
DEB1	Koblenz	1492187
DEB2	Trier	528728
DEB3	Rheinhessen-Pfalz	2045138
DED2	Dresden	1600155
DED4	Chemnitz	1454144
DED5	Leipzig	1027484
DEE0	Sachsen-Anhalt	2236252
DEF0	Schleswig-Holstein	2881926
DEG0	Thüringen	2158128
DK01	Hovedstaden	1807404
DK02	Sjælland	832553
DK03	Syddanmark	1217224
DK04	Midtjylland	1304253
DK05	Nordjylland	587335
EE00	Eesti	1315635

EL30	Attiki	3773559
EL41	Voreio Aigaio	203700
EL42	Notio Aigaio	338383
EL43	Kriti	632674
EL51	Anatoliki Makedonia, Thraki	602799
EL52	Kentriki Makedonia	1880122
EL53	Dytiki Makedonia	271488
EL54	Ipeiros	335250
EL61	Thessalia	725874
EL62	Ionia Nisia	205431
EL63	Dytiki Ellada	663970
EL64	Stereia Ellada	555761
EL65	Peloponnisos	579182
ES11	Galicia	2710216
ES12	Principado de Asturias	1034302
ES13	Cantabria	581490
ES21	País Vasco	2167323
ES22	Comunidad Foral de Navarra	640353
ES23	La Rioja	312624
ES24	Aragón	1316072
ES30	Comunidad de Madrid	6476838
ES41	Castilla y León	2435951
ES42	Castilla-la Mancha	2040977
ES43	Extremadura	1077525
ES51	Cataluña	7441284
ES52	Comunidad Valenciana	4935182
ES53	Illes Balears	1150962
ES61	Andalucía	8408976
ES62	Región de Murcia	1472991
ES63	Ciudad Autónoma de Ceuta (ES)	85034
ES64	Ciudad Autónoma de Melilla (ES)	84946
ES70	Canarias (ES)	2154978
FI19	Länsi-Suomi	1380593
FI1B	Helsinki-Uusimaa	1638293
FI1C	Etelä-Suomi	1159174
FI1D	Pohjois- ja Itä-Suomi	1296023
FI20	Åland	29214
FR10	Île de France	12152461
FRB0	Centre - Val de Loire	2575917
FRC1	Bourgogne	1633186
FRC2	Franche-Comté	1179419

FRD1	Basse-Normandie	1473939
FRD2	Haute-Normandie	1858680
FRE1	Nord-Pas de Calais	4071241
FRE2	Picardie	1930305
FRF1	Alsace	1886550
FRF2	Champagne-Ardenne	1328826
FRF3	Lorraine	2331204
FRG0	Pays de la Loire	3756053
FRH0	Bretagne	3315901
FRI1	Aquitaine	3414116
FRI2	Limousin	734296
FRI3	Poitou-Charentes	1808700
FRJ1	Languedoc-Roussillon	2809609
FRJ2	Midi-Pyrénées	3030683
FRK1	Auvergne	1363035
FRK2	Rhône-Alpes	6594307
FRL0	Provence-Alpes-Côte d'Azur	5036446
FRM0	Corse	333542
FRY2	Martinique	372666
FRY3	Guyane	278165
FRY4	La Réunion	857816
FRY5	Mayotte	250609
HR03	Jadranska Hrvatska	1387363
HR04	Kontinentalna Hrvatska	2766850
HU11	Budapest	1752704
HU12	Pest	1247372
HU21	Közép-Dunántúl	1056097
HU22	Nyugat-Dunántúl	983251
HU23	Dél-Dunántúl	894223
HU31	Észak-Magyarország	1143902
HU32	Észak-Alföld	1468088
HU33	Dél-Alföld	1251924
IE04	Northern and Western	848383
IE05	Southern	1591718
IE06	Eastern and Midland	2344282
ITC1	Piemonte	4392526
ITC2	Valle d'Aosta/Vallée d'Aoste	126883
ITC3	Liguria	1565307
ITC4	Lombardia	10019166
ITF1	Abruzzo	1322247
ITF2	Molise	310449

ITF3	Campania	5839084
ITF4	Puglia	4063888
ITF5	Basilicata	570365
ITF6	Calabria	1965128
ITG1	Sicilia	5056641
ITG2	Sardegna	1653135
ITH1	Provincia Autonoma di Bolzano/Bozen	524256
ITH2	Provincia Autonoma di Trento	538604
ITH3	Veneto	4907529
ITH4	Friuli-Venezia Giulia	1217872
ITH5	Emilia-Romagna	4448841
ITI1	Toscana	3742437
ITI2	Umbria	888908
ITI3	Marche	1538055
ITI4	Lazio	5898124
LT01	Sostines regionas	805173
LT02	Vidurio ir vakaru Lietuvos regionas	2042731
LU00	Luxembourg	590667
LV00	Latvija	1950116
MT00	Malta	460297
NL11	Groningen	583581
NL12	Friesland (NL)	646874
NL13	Drenthe	491792
NL21	Overijssel	1147687
NL22	Gelderland	2047901
NL23	Flevoland	407818
NL31	Utrecht	1284504
NL32	Noord-Holland	2809483
NL33	Zuid-Holland	3650222
NL34	Zeeland	381568
NL41	Noord-Brabant	2512531
NL42	Limburg (NL)	1117546
PL21	Malopolskie	3339803
PL22	Slaskie	4510528
PL41	Wielkopolskie	3457473
PL42	Zachodniopomorskie	1681246
PL43	Lubuskie	1004892
PL51	Dolnoslaskie	2866218
PL52	Opolskie	950710
PL61	Kujawsko-Pomorskie	2060575
PL62	Warminsko-Mazurskie	1410641

PL63	Pomorskie	2285800
PL71	Lódzkie	2471620
PL72	Swietokrzyskie	1237518
PL81	Lubelskie	2112787
PL82	Podkarpackie	2084722
PL84	Podlaskie	1156947
PL91	Warszawski stoleczny	3002278
PL92	Mazowiecki regionalny	2339206
PT11	Norte	3584575
PT15	Algarve	441469
PT16	Centro (PT)	2243934
PT17	Área Metropolitana de Lisboa	2821349
PT18	Alentejo	718087
PT20	Região Autónoma dos Açores (PT)	245283
PT30	Região Autónoma da Madeira (PT)	254876
RO11	Nord-Vest	2568730
RO12	Centru	2332935
RO21	Nord-Est	3239612
RO22	Sud-Est	2446734
RO31	Sud - Muntenia	3003349
RO32	Bucuresti - Ilfov	2287347
RO41	Sud-Vest Oltenia	1973140
RO42	Vest	1792503
SE11	Stockholm	2269060
SE12	Östra Mellansverige	1664145
SE21	Småland med öarna	847667
SE22	Sydsverige	1483018
SE23	Västsverige	1992116
SE31	Norra Mellansverige	848451
SE32	Mellersta Norrland	374245
SE33	Övre Norrland	516451
SI03	Vzhodna Slovenija	1091159
SI04	Zahodna Slovenija	974736
SK01	Bratislavský kraj	641892
SK02	Západné Slovensko	1830751
SK03	Stredné Slovensko	1342287
SK04	Východné Slovensko	1620413
UKC1	Tees Valley and Durham	1194437
UKC2	Northumberland and Tyne and Wear	1446249
UKD1	Cumbria	498641
UKD3	Greater Manchester	2789735

UKD4	Lancashire	1487102
UKD6	Cheshire	924261
UKD7	Merseyside	1541473
UKE1	East Yorkshire and Northern Lincolnshire	929189
UKE2	North Yorkshire	818141
UKE3	South Yorkshire	1389426
UKE4	West Yorkshire	2301000
UKF1	Derbyshire and Nottinghamshire	2187643
UKF2	Leicestershire, Rutland and Northamptonshire	1812852
UKF3	Lincolnshire	747996
UKG1	Herefordshire, Worcestershire and Warwickshire	1338055
UKG2	Shropshire and Staffordshire	1613788
UKG3	West Midlands	2883905
UKH1	East Anglia	2493326
UKH2	Bedfordshire and Hertfordshire	1841673
UKH3	Essex	1813609
UKI3	Inner London - West	1163136
UKI4	Inner London - East	2367065
UKI5	Outer London - East and North East	1899556
UKI6	Outer London - South	1295666
UKI7	Outer London - West and North West	2071842
UKJ1	Berkshire, Buckinghamshire and Oxfordshire	2385514
UKJ2	Surrey, East and West Sussex	2871387
UKJ3	Hampshire and Isle of Wight	1973952
UKJ4	Kent	1824794
UKK1	Gloucestershire, Wiltshire and Bristol/Bath area	2474784
UKK2	Dorset and Somerset	1322286
UKK3	Cornwall and Isles of Scilly	560526
UKK4	Devon	1180517
UKL1	West Wales and The Valleys	1960764
UKL2	East Wales	1158491
UKM5	North Eastern Scotland	491323
UKM6	Highlands and Islands	469420
UKM7	Eastern Scotland	1976392
UKM8	West Central Scotland	1531216
UKM9	Southern Scotland	946372
UKN0	Northern Ireland (UK)	1866638