The ERA Registry Annual Report 2019 : summary and age comparisons

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ORIGINAL ARTICLE

The ERA Registry Annual Report 2019: summary and age comparisons

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ABSTRACT

Background. Data on renal replacement therapy (RRT) for end-stage renal disease were collected by the European Renal Association (ERA) Registry via national and regional renal registries in Europe and countries bordering the Mediterranean Sea. This article provides a summary of the 2019 ERA Registry Annual Report, including data from 34 countries and additional age comparisons.

Methods. Individual patient data for 2019 were provided by 35 registries and aggregated data by 17 registries. Using these data, the incidence and prevalence of RRT, the kidney transplantation activity and the survival probabilities were calculated.

Results. In 2019, a general population of 680.8 million people was covered by the ERA Registry. Overall, the incidence of RRT was 132 per million population (p.m.p.). Of these patients, 62% were men, 54% were ≥65 years of age and 21% had diabetes mellitus as primary renal disease (PRD), and 84% had haemodialysis (HD), 11% had peritoneal dialysis (PD) and 5% had pre-emptive kidney transplantation as an initial treatment modality. The overall prevalence of RRT on 31 December 2019 was 893 p.m.p., with 58% of patients on HD, 5% on PD and 37% living with a kidney transplant. The overall kidney transplant rate was 35 p.m.p. and 29% of the kidney grafts were from a living donor. The unadjusted 5-year survival probability was 42.3% for patients commencing dialysis, 86.6% for recipients of deceased donor grafts and

94.4% for recipients of living donor grafts in the period 2010–14. When comparing age categories, there were substantial differences in the distribution of PRD, treatment modality and kidney donor type, and in the survival probabilities.

Keywords: dialysis, epidemiology, ESRD, graft survival, kidney transplantation, patient survival

INTRODUCTION

This article provides a summary of the European Renal Association (ERA) Registry's 2019 Annual Report (Supplementary data), which presents the latest data on the epidemiology of renal replacement therapy (RRT) for end-stage renal disease (ESRD) in Europe and countries bordering the Mediterranean Sea. Data were provided to the ERA Registry by a total of 52 national or regional registries from 34 countries; 35 registries provided individual patient data and 17 renal registries provided aggregated data (Appendix 1). Compared with the 2018 Annual Report, this year data from Poland could be included, while data from Bulgaria could not be included. In addition, this year for the first time, individual patient data from the Spanish region La Rioja were included. The coverage of the general population was 680.3 million people for the incidence calculations and 680.8 million people for the prevalence calculations, the discrepancy resulting from a difference in coverage of the general population in the Netherlands. When excluding Israel, the remaining countries cover a general population of 672 million people, representing 78.0% of the 2019 European general population. This coverage is higher than the 74.2% covered in the 2018 Annual Report [1].

The 2019 incidence and prevalence of RRT, kidney transplantation activity and both patient and graft survival in Europe are presented in this article. In addition, this year's annual report contains additional age comparisons that are also presented in this article. Further details on the methodology used for analysis, as well as the complete results, can be found in the ERA Registry 2019 Annual Report (Supplementary data).

RESULTS

Incidence of RRT

In 2019, 89 579 individuals out of a population of 680.3 million people initiated RRT for ESRD, corresponding to around 1 per every 7500 Europeans [132 per million population (p.m.p.); Table 1]. The unadjusted incidence ranged from around 1 per 25 000 inhabitants (40 p.m.p.) in Ukraine and 1 per 13 500 inhabitants (74 p.m.p.) in Estonia to around 1 per 3500 inhabitants (269 p.m.p. and 284 p.m.p.) in Greece and Cyprus (Table 1 and Figures 1 and 2). The adjusted incidence rate [standardized to the age and sex distribution of the European Union 28 (EU-28) countries' population in 2015] [2] was available for 27 countries and ranged between 1 per 13 500 inhabitants (75 p.m.p.) in Estonia and 1 per 3500 inhabitants (300 p.m.p.) in Israel (Figure 2). For patients with diabetes mellitus (DM) as primary renal disease (PRD), the unadjusted incidence of RRT was 28 p.m.p, ranging from 8 and 10 p.m.p. in Iceland and Ukraine, respectively, to 92 and 120 p.m.p. in Israel and Cyprus, respectively (Table 1). The median age of patients starting RRT was 67.9 years, but this differed by 20 years between Ukraine (54.0 years) and Greece (74.4 years; Table 1). Of the total group of patients commencing RRT, 62% were men, 54% were aged ≥65 years and 21% had DM as PRD (Figure 3). When initiating RRT, the majority (84%) of patients started on haemodialysis (HD), 11% started on peritoneal dialysis (PD) and 5% of patients received a pre-emptive kidney transplant (Figure 4). The distribution of initial treatment modalities was similar for men and women (Figure 4). Patients with DM as PRD more often started RRT on HD compared with those without DM (86% versus 80%) and less frequently received a pre-emptive kidney transplant (2% versus 6%). On Day 91 after the start of RRT, 82% of incident patients were receiving HD, 13% were receiving PD and 5% were living with a functioning kidney transplant (Figure 5).

Prevalence of RRT

On 31 December 2019, 607 320 patients were receiving RRT for ESRD, corresponding to around 1 per every 1000 Europeans (893 p.m.p.; Table 2). Within individual countries or regions, the unadjusted prevalence ranged from 1 per 4000 inhabitants (244 p.m.p.) in Ukraine and 1 per 2500 inhabitants (376 p.m.p.) in Montenegro to 1 per 650 inhabitants (1582 p.m.p.) in the Valencian region (Spain) and 1 per 500 inhabitants (2008 p.m.p.) in Portugal (Table 2 and Figures 6 and 7). The adjusted prevalence rate was available for 25 countries and ranged from 1 per 2500 inhabitants (393 p.m.p.) in Montenegro to 1 per 650 inhabitants (1566 p.m.p.) in Murcia (Spain; Figure 7). The prevalence of patients with DM as PRD was 154 p.m.p. and ranged from 38 p.m.p. in Ukraine to 425 p.m.p. in Canary Islands (Spain). Prevalent patients receiving RRT had a median age of 60.5 years, which ranged from 53.0 years in Albania to 69.0 years in Israel (Table 2). Among the prevalent patients, 61% were men, 45% were aged ≥65 years and 15% had DM as PRD (Figure 8). Furthermore, 58% of the prevalent patients were receiving HD, while 5% were receiving PD and a further 37% were living with a kidney transplant (Figure 9). Patients with DM as PRD were less likely to be living with a functioning kidney transplant compared with patients with a PRD other than DM (29% versus 51%).

Kidney transplantation

A total of 24 013 kidney transplantations were carried out in 2019, resulting in an overall unadjusted transplant rate of around 1 per 28 500 Europeans (35 p.m.p.; Figure 10). In the individual countries or regions, the unadjusted kidney transplant rates ranged from 1 per 350 000 inhabitants (3 p.m.p.) in Serbia and Ukraine to 1 per 10 000 inhabitants (98 p.m.p.) in Navarre (Spain) and 1 per 8500 inhabitants (115 p.m.p.) in Catalonia (Spain). Altogether, the unadjusted deceased donor kidney transplant rate was more than twice that of living donor transplants (69% versus 29%; 24 p.m.p. versus 10 p.m.p.; Figures 11 and 12). The highest unadjusted rates of deceased donor kidney transplants were found in some Spanish regions [more than 1 per 12 500 inhabitants (>80 p.m.p.); Figure 12], while the highest unadjusted rates of living donor transplants were observed in Northern Ireland [1 per 29 500 inhabitants (34 p.m.p.)] and Turkey [1 per 27 000 inhabitants (37 p.m.p.); Figure 12].

Survival of patients receiving RRT

During the period 2010–14, the 5-year unadjusted patient survival probability for patients commencing RRT was 51.9% [95%

Table 1. Incidence of RRT (as count and p.m.p.) in 2019 on Day 1, by country or region, unadjusted and the mean and median age at the start of RRT and the incidence of RRT for patients with DM as primary renal disease (as count and p.m.p.)

Country/region	General population covered by the registry in thousands	Incidence of RRT in 2019, at Day 1					
		All (*n*)	All (p.m.p.)	Mean age (years)	Median age (years)	DM (*n*)	DM (p.m.p.)
Albania	2833	356	126	60.0	62.5	73	26
Austria[a]	8859	1200	135	65.5	68.9	284	32
Belarus[b]	9466	883	93			187	20
Belgium, Dutch-speaking[c]	6618	1254	189	70.6	73.5	234	35
Belgium, French-speaking[c]	4871	997	205	67.3	69.4	227	47
Bosnia and Herzegovina	3531	391	111	63.5	64.9	114	32
Cyprus	888	252	284	69.0	73.0	107	120
Czech Republic[d]	10 480	2267	216				
Denmark	5871	634	108	62.0	66.1	168	29
Estonia	1327	98	74	59.2	62.8	21	16
Finland	5522	530	96	62.2	66.0	158	29
France	67 249	11 417	170	67.8	70.6	2674	40
Greece	10 722	2883	269	71.7	74.4	749	70
Iceland	361	39	108	63.1	66.3	3	8
Israel	9053	1790	198	66.1	69.4	836	92
Italy (8 of 20 regions)	22 431	3703	165	69.5	72.3	568	25
Kosovo	1688	192	114	59.5	61.5	71	42
Latvia	1297	121	93	62.1	65.0	32	25
Lithuania	2794	315	113	65.1	64.0	62	22
Montenegro[c]	622	70	113	61.3	64.7	17	27
North Macedonia	2076	380	183	64.9	66.0	94	45
Norway	5348	606	113	63.7	68.0	113	21
Poland	38 383	5865	153			1840	48
Portugal[e]	10 277	2673	260			872	85
Romania	19 100	3643	191	62.9	65.0	432	23
Russia[d]	143 814	12 602	88			2837	20
Serbia	6251	511	82	61.8	64.8	130	21
Slovakia[d]	4644	566	122	64.2	66.0	174	37
Spain (All)	47 026	7133	152	63.4	67.9	1740	37
Spain, Andalusia	8453	1272	150	63.9	66.9	344	41
Spain, Aragon	1325	177	134	65.2	68.9	49	37
Spain, Asturias	1021	173	170	68.0	69.0	44	43
Spain, Basque country	2184	277	127	64.6	68.4	66	30
Spain, Canary Islands	2222	392	176	64.7	67.0	128	58
Spain, Cantabria[c]	582	75	129	66.1	67.9	20	34
Spain, Castile and León[c]	2400	319	133	68.1	69.9	85	35
Spain, Castile-La Mancha[c]	2040	237	116	66.4	69.4	73	36
Spain, Catalonia	7675	1403	183	65.9	69.5	236	31
Spain, Community of Madrid	6663	823	124	64.4	67.4	215	32
Spain, Extremadura	1068	154	144	65.2	67.0	37	35
Spain, Galicia	2702	464	172	65.7	67.8	125	46
Spain, La Rioja	315	28	89	66.7	72.1	9	29
Spain, Murcia	1494	244	163	65.5	68.9	61	41
Spain, Navarre[c]	653	102	156	68.4	71.5	24	37
Spain, Valencian region	5004	849	170	66.2	69.0	194	39
Sweden	10 279	1164	113	64.0	68.1	271	26
Switzerland	8575	848	99	66.1	69.3	171	20
The Netherlands	16 131	1939	120	63.7	67.2	363	23
Turkey[f]	83 155	12 518	151			560	56
UK, England	56 287	6889	122	61.1	64.1	1815	32
UK, Northern Ireland	1894	207	109	61.0	63.0	42	22
UK, Scotland	5463	566	104	58.3	60.8	166	30
UK, Wales	3153	402	128	62.0	65.4	144	46
Ukraine[b]	41 984	1675	40	52.9	54.0	399	10
All countries	680 322	89 579	132	64.9	67.9	18 748	28

When cells are left empty, the data are unavailable and could not be used for the calculation of the summary data.

[a]The incidence is underestimated by approximately 1% due to one haemodialysis centre not submitting data.

[b]Patients younger than 18 years of age are not reported.

[c]Patients younger than 20 years of age are not reported: the true incidence counts are therefore slightly higher than the counts reported here.

[d]Data include dialysis patients only.

[e]Data on the incidence of primary renal disease are available for dialysis patients only (98.8%, total $n = 2673$).

[f]Data on the incidence of primary renal disease (DM) is based on 1498 dialysis patients (12.0% of total).

RRT, renal replacement therapy; DM, diabetes mellitus as primary renal disease.

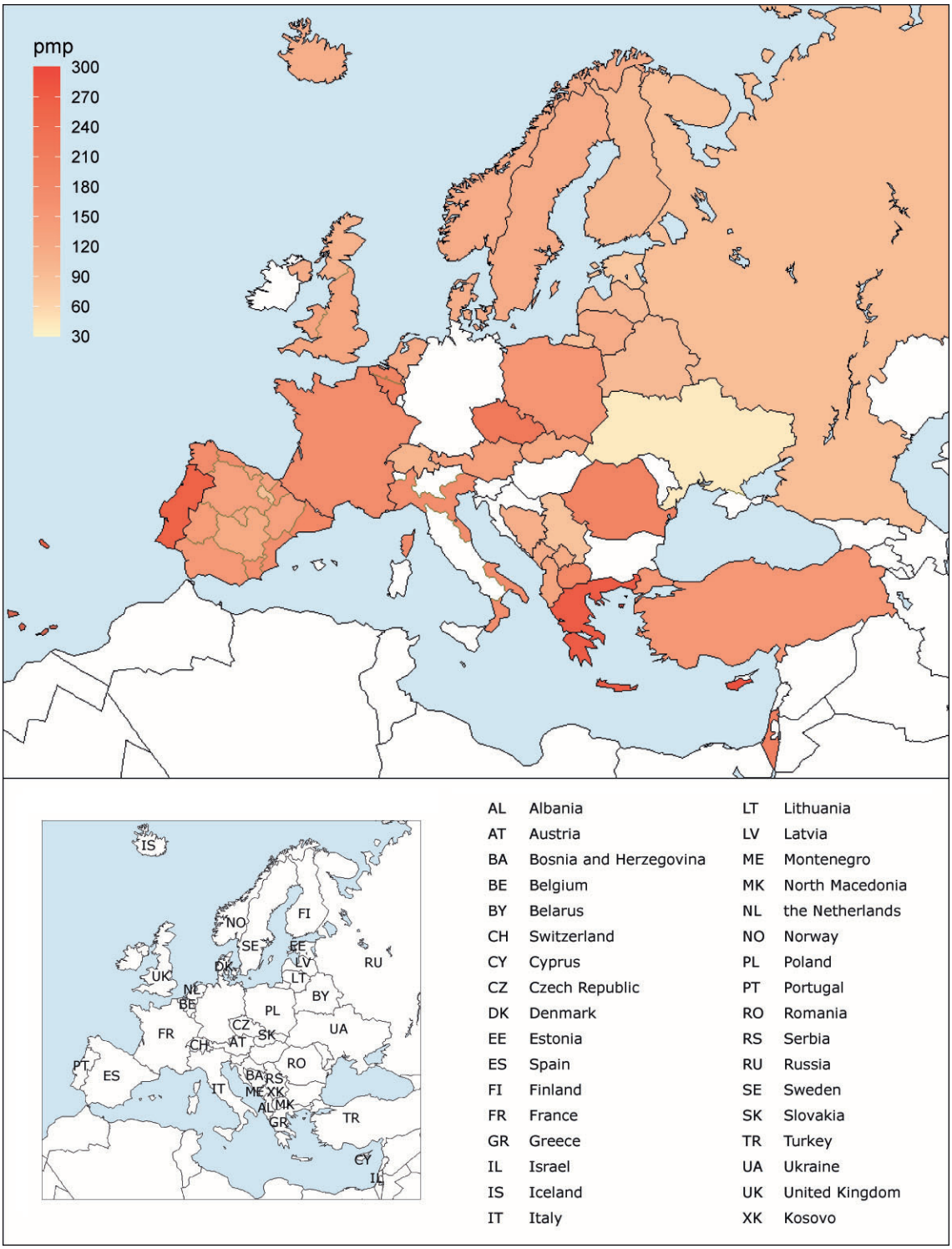


FIGURE 1: Incidence of RRT (p.m.p.) in 2019, on Day 1, by country or region, unadjusted. The incidence for Czech Republic, Russia and Slovakia only includes patients receiving dialysis.

confidence interval (95% CI) 51.6–52.1 Table 3]. Patients starting RRT on dialysis in this period had an observed unadjusted 5-year patient survival probability of 42.3% (95% CI 42.1–42.6). Higher survival probabilities in the first 2 years for those receiving PD were identified through an adjusted analysis focusing on HD and PD (Figure 13). Among patients receiving a kidney transplant in the period 2010–14, living donor transplant recipients experienced a higher adjusted 5-year patient survival than

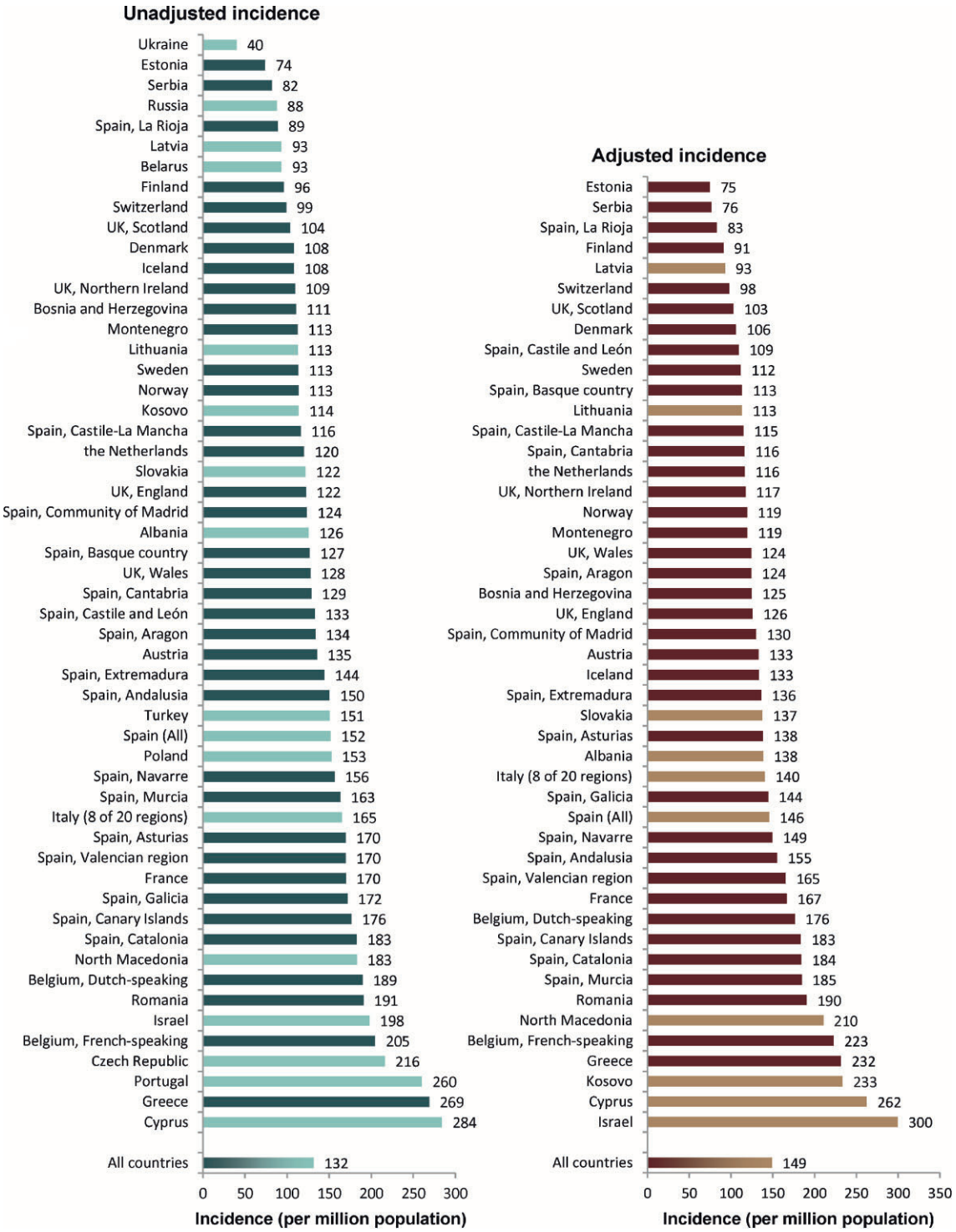


FIGURE 2: Unadjusted (left panel) and adjusted (right panel) incidence of RRT p.m.p. in 2019, on Day 1, by country or region. Registries providing individual patient data are shown as dark-coloured bars and registries providing aggregated data as light-coloured bars. Age- and sex-adjusted incidence was calculated by standardization to the age and sex distribution of the EU-28 population. The incidence for Czech Republic, Russia and Slovakia only includes patients receiving dialysis.

recipients of deceased donor transplants, 95.1% (95% CI 94.7–95.6) versus 92.3% (95% CI 92.0–92.6; Figure 13 and Table 3). Living donor transplant recipients also had a higher adjusted 5-year graft survival compared with deceased donor transplants, 87.9% (95% CI 87.3–88.5) versus 81.6% (95% CI 81.2–82.0; Table 3). A description of the adjustments made and the countries and regions included in these analyses can be found in Table 3.

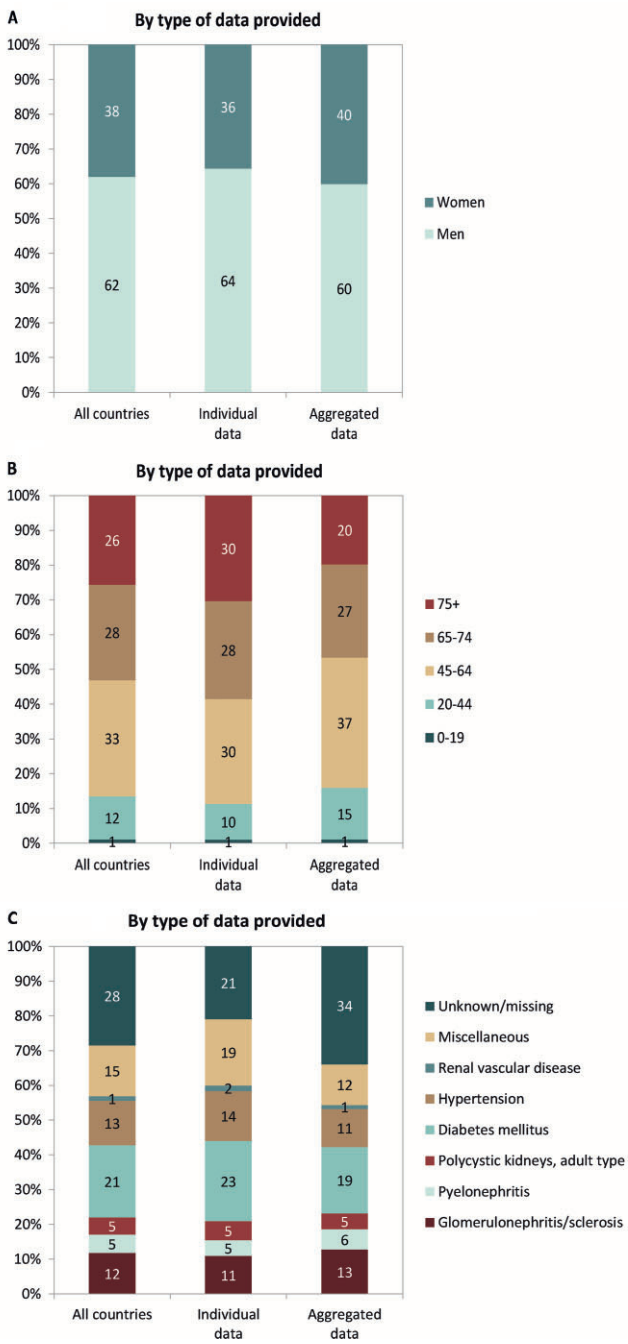


FIGURE 3: (A) Sex, (B) age and (C) primary renal disease distribution by type of data provided for incident patients accepted for RRT in 2019, on Day 1. See Appendix 1 for a list of countries and regions providing individual patient data or aggregated data.

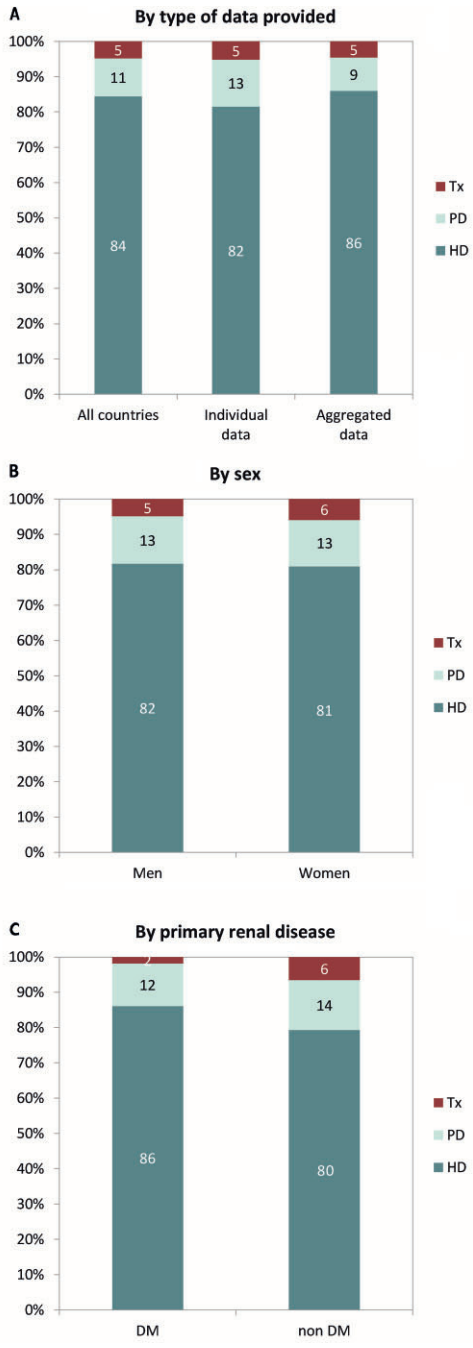


FIGURE 4: Treatment modality distribution, on Day 1, by (A) type of data provided, (B) sex and (C) primary renal disease (DM and non-DM) for incident patients accepted for RRT in 2019. Panels (B) and (C) are only based on the data from registries providing individual patient data. See Appendix 1 for a list of countries and regions providing individual patient data or aggregated data. DM, diabetes mellitus; HD, haemodialysis; PD, peritoneal dialysis; Tx, kidney transplant.

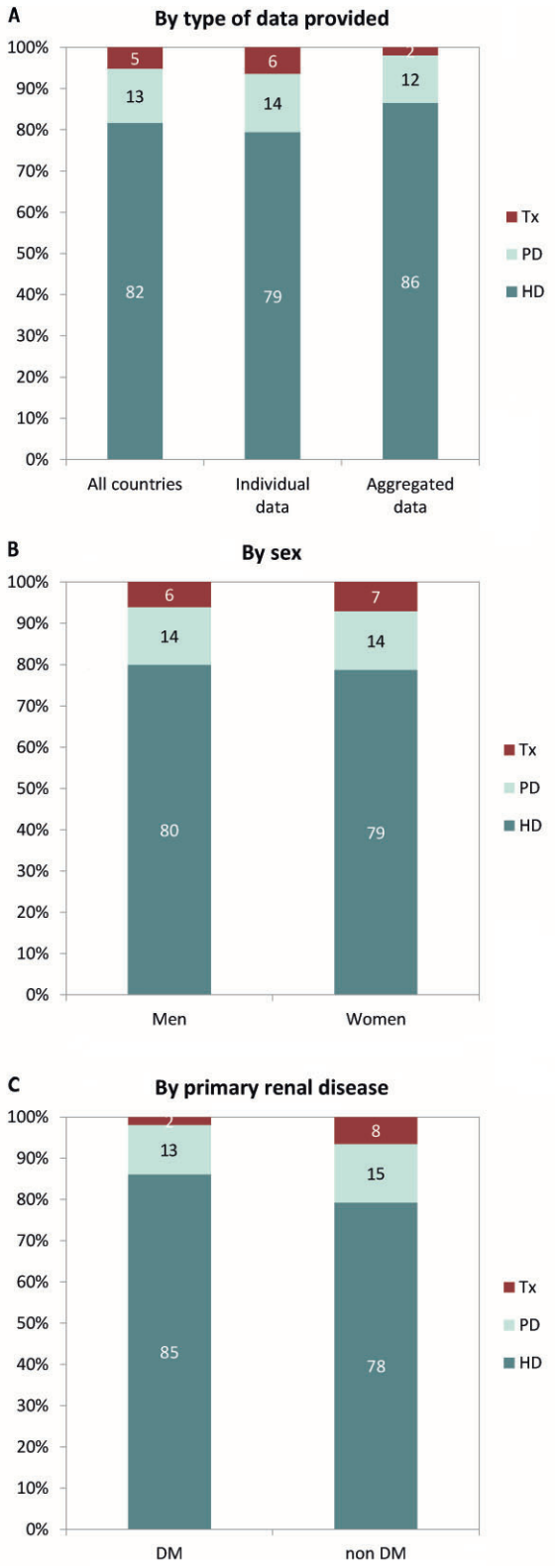


FIGURE 5: Treatment modality distribution, on Day 91, by (**A**) type of data provided, (**B**) sex and (**C**) primary renal disease (DM and non-DM) for incident patients accepted for RRT in 2019. Parts (**B**) and (**C**) are only based on the data from registries providing individual patient data. See Appendix 1 for a list of countries and regions providing individual patient data or aggregated data. DM, diabetes mellitus; HD, haemodialysis; PD, peritoneal dialysis; Tx, kidney transplant.

Expected remaining lifetime

Based on data from the period 2015 to 2019, patients receiving dialysis are expected to live only around half of the estimated remaining lifetime of patients living with a functioning kidney transplant (Figure 14). The life expectancy of patients on dialysis was about 70% shorter than that in the general population. For kidney transplant recipients, life expectancy was approximately 40% shorter than that of the general population.

Age comparisons

Figures 15–21 show the comparisons of age groups using data from 35 national or regional renal registries in 18 countries providing individual patient data. In 2019, the incidence of RRT ranged from around 1 per 170 000 persons aged 0–19 years [6 per million age-related population (p.m.a.r.p.)] to around 1 per 1900 persons aged ≥75 years (539 p.m.a.r.p.; Figure 15). The proportion of women was higher in patients aged 0–19 years (43%) than in older age groups (34–38%). In addition, there were considerable differences in the PRD distribution (Figure 16). Especially in the youngest age category, a high proportion of patients with ESRD due to miscellaneous causes was observed, likely resulting from hereditary and congenital diseases being included in this PRD category (Appendix 2). On the other hand, the proportion of patients with DM or hypertension as PRD increased with age. In addition, the distribution of initial treatment modalities differed between age groups, with decreasing proportions of patients receiving either PD or a pre-emptive transplant with advancing age (Figure 16).

On 31 December 2019, the unadjusted prevalence of RRT ranged from around 1 per 19 000 persons aged 0–19 years (53 p.m.a.r.p.) to 1 per 300 persons aged ≥75 years (3154 p.m.a.r.p.; Figure 17). The distribution of men and women was similar among all age groups, with approximately 38% being women (Figure 18). A total of 60% of RRT patients aged 0–19 years had miscellaneous PRD (Figure 18). The distribution of treatment modalities differed largely between age groups, with 78% of patients aged 0–19 years living with a functioning kidney graft compared with 18% of patients aged ≥75 years (Figure 18).

Figure 19 shows the number of kidney transplants in each recipient age group. The group of recipients aged 45–64 years received the highest number of kidney transplants, representing 47% of the total number of kidneys transplanted in 2019. In total, 77% of kidney transplantations were performed using deceased donor grafts. However, this proportion differed between the age groups, ranging from 63% deceased donor grafts in patients aged 0–19 years to 93% in patients aged ≥75 years (Figure 20).

Figure 21 shows the adjusted patient survival probabilities by age category for patients on dialysis or recipients of a first kidney transplantation. In dialysis patients, the 5-year patient survival ranged from 90% in patients aged 0–19 years to 25% in patients aged ≥75 years. For kidney transplant recipients, the 5-year patient survival after first kidney transplantation ranged from 97% in patients aged 0–19 years to 66% in patients aged ≥75 years.

AFFILIATED REGISTRIES

Albanian Renal Registry (A. Idrizi, M. Rroji and E. Likaj); Austrian Dialysis and Transplant Registry (OEDTR) (F. Engler, R. Kramar,

Table 2. Prevalence of RRT (as count and p.m.p.) on 31 December 2019, by country or region, unadjusted and the mean and median age on 31 December 2019 and the prevalence of RRT for patients DM as primary renal disease (as count and p.m.p.)

Country/region	General population covered by the registry in thousands	Prevalent patients on RRT in 2019					
		All (*n*)	All (p.m.p.)	Mean age (years)	Median age (years)	DM (*n*)	DM (p.m.p.)
Albania	2833	1706	602	51.9	53.0	352	124
Austria[a]	8859	9250	1044	62.4	63.7	1407	159
Belarus[b]	9466	3948	417			515	54
Belgium, Dutch-speaking[c]	6618	8648	1307	66.6	68.5	1431	216
Belgium, French-speaking[c]	4871	6658	1367	65.3	67.0	1194	245
Bosnia and Herzegovina	3531	2695	763	60.2	62.0	543	154
Cyprus	888						
Czech Republic	10 480	11 543	1101				
Denmark	5871	5591	952	59.1	60.5	943	161
Estonia	1327	1040	784	58.8	59.5	195	147
Finland	5522	5198	941	59.9	62.4	1300	235
France	67 249	92 512	1376	63.4	65.5	15 299	227
Greece	10 722	15 153	1413	65.8	68.0	2903	271
Iceland	361	292	810	57.4	58.8	32	89
Israel[d]	9053	6839	755	67.0	69.0	3239	358
Italy (8 of 20 regions)	22 431	28 622	1276	63.3	65.4	2992	133
Kosovo	1688	792	469	60.1	61.0	248	147
Latvia	1297	1040	802	56.1	58.0	119	92
Lithuania	2794	2424	868				
Montenegro[c]	622	234	376	58.5	60.5	41	66
North Macedonia	2076	1853	893	59.8	61.0	329	158
Norway	5348	5369	1004	60.2	62.5	746	139
Poland[d]	38 383	21 339	556			6211	162
Portugal[e,f]	10 277	20 640	2008	67.5		3694	359
Romania	19 100	22 236	1164	63.2	65.0	2222	116
Russia	143 814	59 106	411			10 752	75
Serbia	6251	5495	879	60.5	62.9	956	153
Slovakia[d]	4644	3161	681	64.7	67.0	904	195
Spain (All)	47 026	64 311	1368	60.7	64.0	10 566	225
Spain, Andalusia	8453	10 943	1295	61.2	62.5	1793	212
Spain, Aragon	1325	1800	1358	64.4	66.1	322	243
Spain, Asturias	1021	1438	1409	64.4	65.6	255	250
Spain, Basque country	2184	2767	1267	62.2	64.4	342	157
Spain, Canary Islands	2222	3409	1534	62.5	63.6	944	425
Spain, Cantabria[c]	582	668	1148	63.3	64.8	102	175
Spain, Castile and León[c]	2400	3149	1312	65.5	66.5	552	230
Spain, Castile-La Mancha[c]	2040	2526	1238	63.6	64.5	424	208
Spain, Catalonia	7675	11 551	1505	63.4	65.1	1630	212
Spain, Community of Madrid	6663	8017	1203	62.5	63.9	1439	216
Spain, Extremadura	1068	1358	1272	62.7	63.2	213	199
Spain, Galicia	2702	3994	1478	63.5	64.9	699	259
Spain, La Rioja	315	393	1249	62.4	64.7	47	149
Spain, Murcia	1494	2128	1424	62.6	63.7	320	214
Spain, Navarre [c]	653	896	1372	63.8	65.7	138	211
Spain, Valencian region	5004	7914	1582	63.8	65.8	1160	232
Sweden	10 279	10 240	996	60.3	62.4	1786	174
Switzerland	8575	8298	968	62.8	64.7	1259	147
The Netherlands	16 651	17 886	1074	61.1	63.1	2386	143
Turkey[g]	83 155	83 783	1008			2381	371
UK, England	56 287	58 406	1043	58.2	59.3	10 242	183
UK, Northern Ireland	1894	1966	1045	58.2	59.0	282	150
UK, Scotland	5463	5435	995	57.2	58.5	942	172
UK, Wales	3153	3361	1071	58.9	60.5	607	193
Ukraine[b]	41 984	10 250	244	53.4	55.0	1614	38
All countries	680 842	607 320	893	61.8	60.5	90 633	154

When cells are left empty, the data are unavailable and could not be used for the calculation of the summary data.

[a]The prevalence is underestimated by approximately 1% due to one haemodialysis centre not submitting data.

[b]Patients younger than 18 years of age are not reported.

[c]Patients younger than 20 years of age are not reported. The true prevalent counts are therefore slightly higher than the counts reported here.

[d]Data on prevalence include dialysis patients only.

[e]Data on mean age include dialysis patients only.

[f]Data on primary renal disease are available for dialysis patients only (64.8%, total $n = 20\,640$).

[g]Data on the prevalence of primary renal disease (DM) is based on 6460 dialysis patients (7.6% of total).

RRT, renal replacement therapy; DM, diabetes mellitus as primary renal disease.

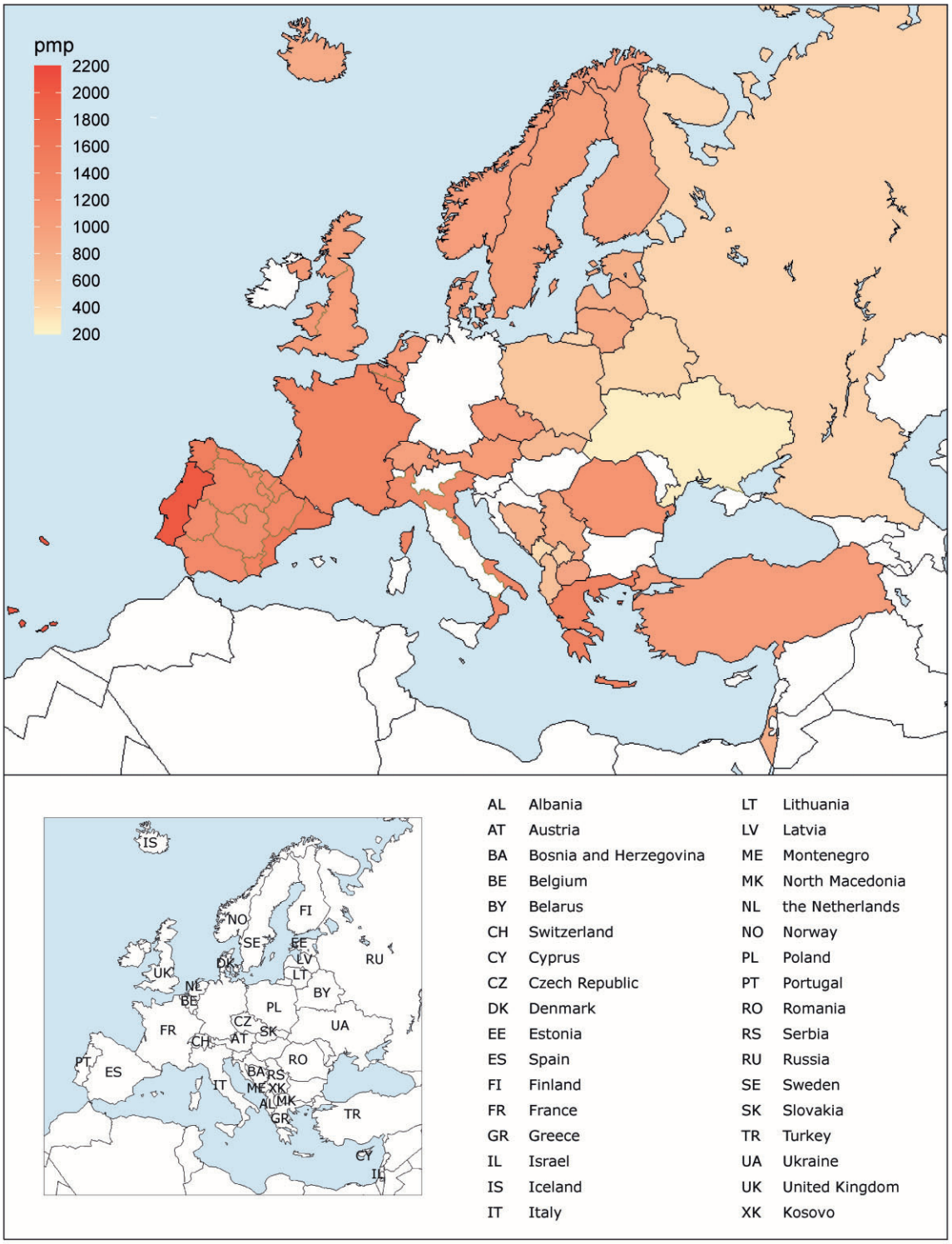


FIGURE 6: Prevalence of RRT (p.m.p.) on 31 December 2019 by country or region. The prevalence for Israel, Poland and Slovakia only includes patients receiving dialysis.

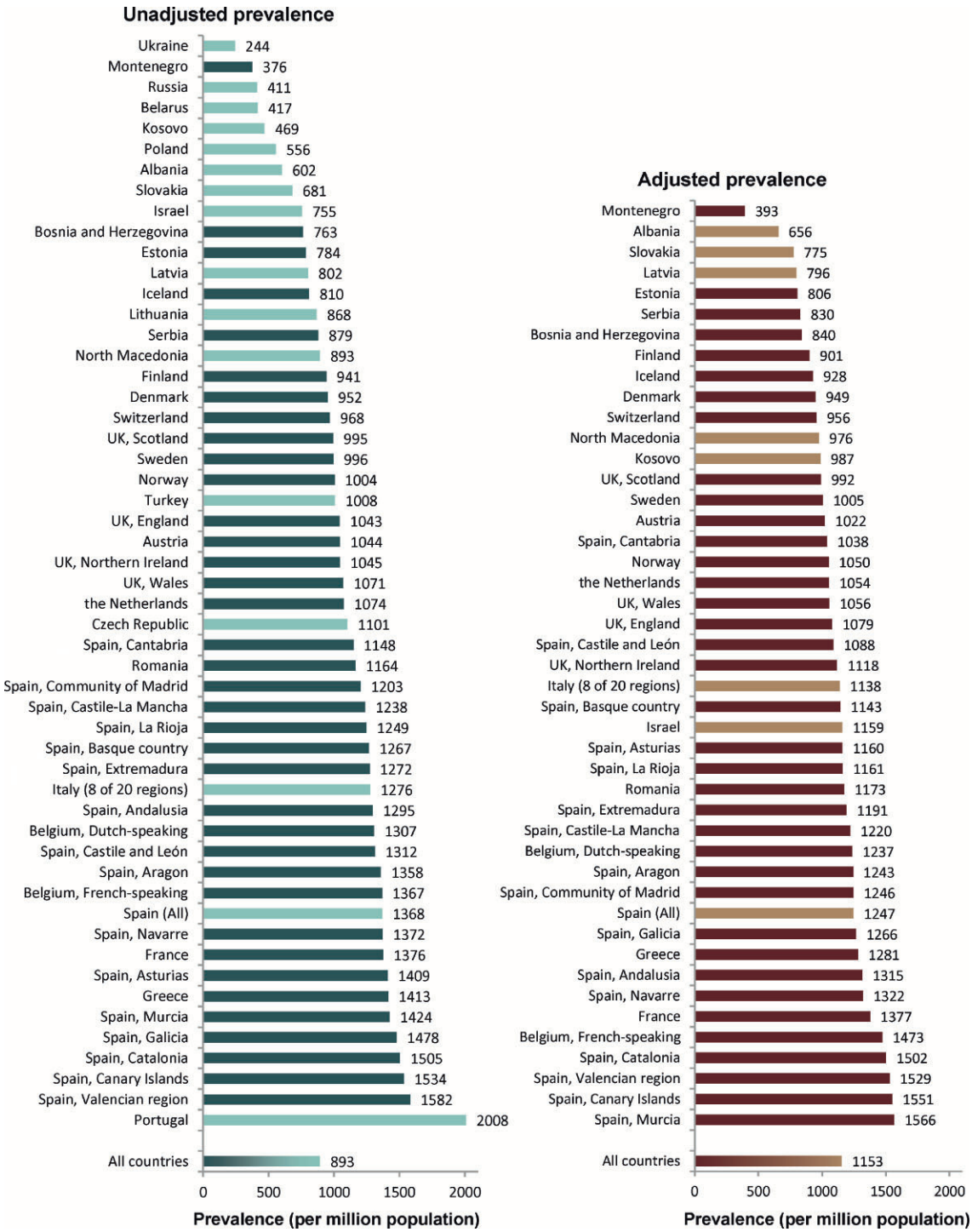


FIGURE 7: Unadjusted (left panel) and adjusted (right panel) prevalence (p.m.p.) of RRT on 31 December 2019 by country or region. Registries providing individual patient data are shown as dark-coloured bars and registries providing aggregated data as light-coloured bars. Age- and sex-adjusted prevalence was calculated by standardization to the age and sex distribution of the EU-28 population. The prevalence for Israel, Poland and Slovakia only includes patients receiving dialysis.

FIGURE 8: (A) Sex, (B) age and (C) primary renal disease distribution, by type of data provided for prevalent patients on RRT on 31 December 2019. See Appendix 1 for a list of countries and regions providing individual patient data or aggregated data.

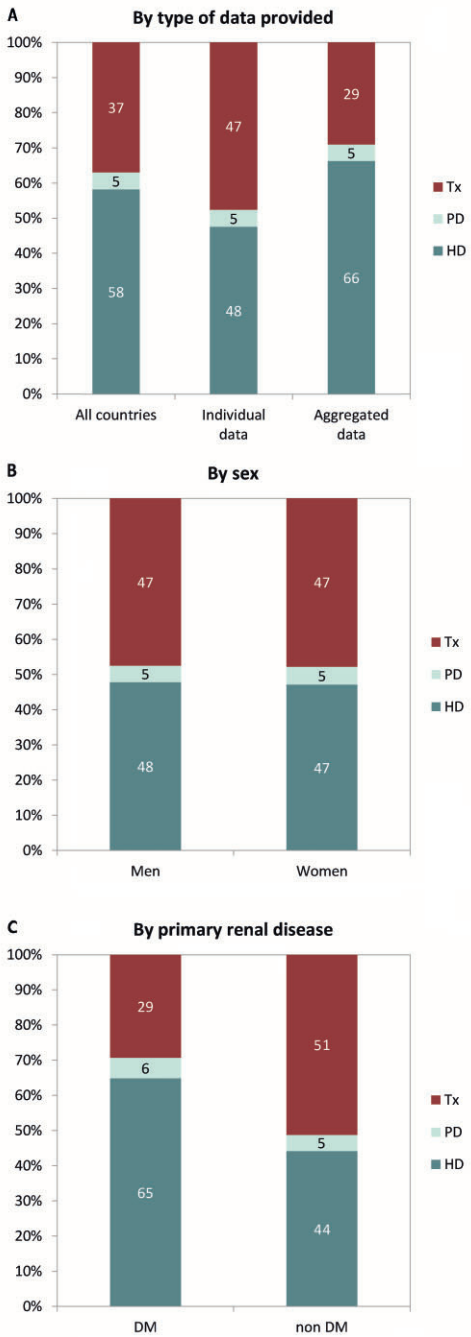
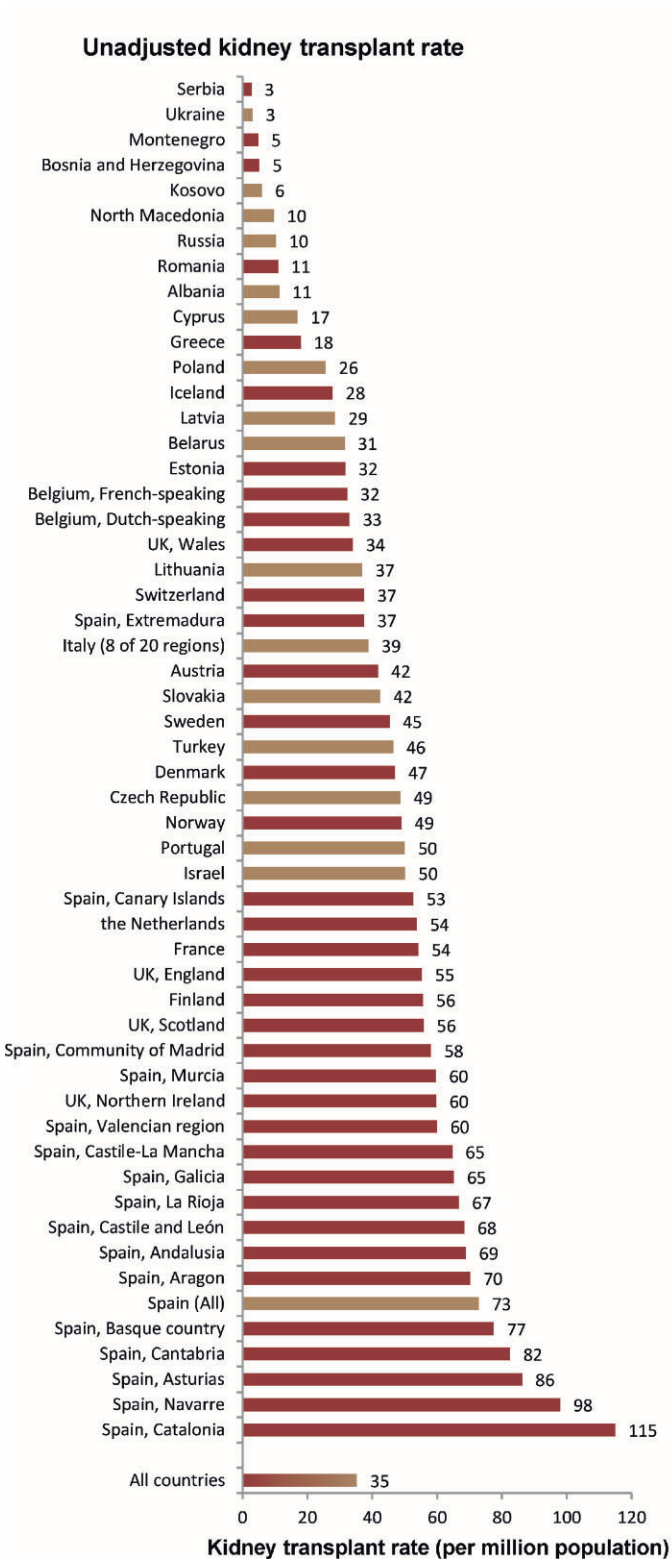


FIGURE 9: Treatment modality distribution by (A) type of data provided, (B) sex and (C) primary renal disease (DM and non-DM) for prevalent patients on RRT on 31 December 2019. Parts (B) and (C) are only based on the data from registries providing individual patient data. See Appendix 1 for a list of countries and regions providing individual patient data or aggregated data. DM, diabetes mellitus; HD, haemodialysis; PD, peritoneal dialysis; Tx, kidney transplant.



	All N	% Deceased donor	% Living donor	% Unknown donor type
Serbia	17	53	47	0
Ukraine	128	45	55	0
Montenegro	3	0	100	0
Bosnia and Herzegovina	18	22	78	0
Kosovo	10	0	100	0
North Macedonia	20	30	70	0
Russia	1473	88	12	0
Romania	208	56	42	1
Albania	32	0	100	0
Cyprus	15	40	60	0
Greece	192	64	36	0
Poland	983	92	5	2
Iceland	10	20	80	0
Latvia	37	84	16	0
Belarus	298	99	1	0
Estonia	42	93	7	0
Belgium, French-speaking	157	90	7	3
Belgium, Dutch-speaking	218	91	9	0
UK, Wales	107	69	31	0
Lithuania	103	93	7	0
Switzerland	321	68	32	0
Spain, Extremadura	40	90	8	3
Italy (8 of 20 regions)	870	90	10	0
Austria	394	79	21	0
Slovakia	197	89	11	0
Sweden	466	69	31	0
Turkey	3858	21	79	0
Denmark	276	68	32	0
Czech Republic	510	90	10	0
Norway	262	73	27	0
Portugal	514	85	15	0
Israel	454	36	54	10
Spain, Canary Islands	117	98	2	0
the Netherlands	913	47	53	0
France	3645	86	14	0
UK, England	3114	66	22	12
Finland	307	86	7	6
UK, Scotland	305	69	31	0
Spain, Community of Madrid	387	90	10	0
Spain, Murcia	89	92	8	0
UK, Northern Ireland	113	42	58	
Spain, Valencian region	300	96	4	0
Spain, Castile-La Mancha	132	95	4	2
Spain, Galicia	176	80	20	0
Spain, La Rioja	21	90	10	0
Spain, Castile and León	164	91	9	0
Spain, Andalusia	582	94	6	0
Spain, Aragon	93	88	12	0
Spain (All)	3423	90	10	0
Spain, Basque country	169	89	11	0
Spain, Cantabria	48	98	2	0
Spain, Asturias	88	98	2	0
Spain, Navarre	64	97	3	0
Spain, Catalonia	882	85	15	0
All countries	24013	69	29	2

FIGURE 10: Kidney transplants performed in 2019, presented as counts and p.m.p., by country or region, unadjusted. Registries providing individual patient data are shown as red-coloured bars and registries providing aggregated data as orange-coloured bars. The total count for Austria is based on residents and non-residents. For Romania, Serbia and the Netherlands, the overall kidney transplant rate is underestimated by 30%, 15% and 2%, respectively.

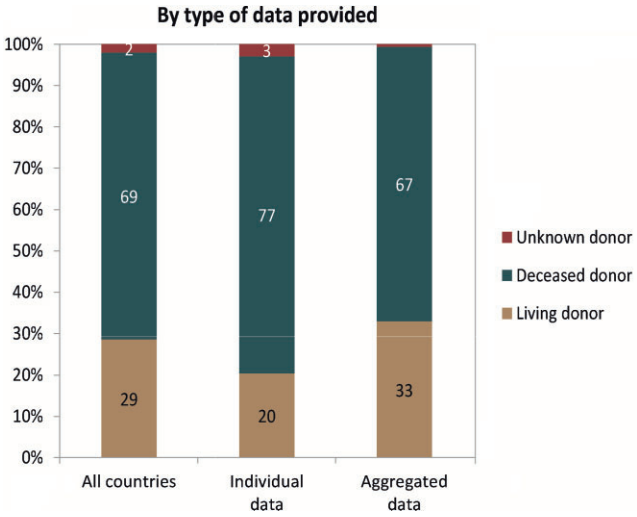


FIGURE 11: Donor-type distribution for kidney transplants performed in 2019, by type of data provided. See Appendix 1 for a list of countries and regions providing individual patient data or aggregated data.

G. Mayer and the Austrian Society of Nephrology); Belarus Renal Registry (K.S. Komissarov and K.S. Kamisarau); Dutch speaking Belgian Society of Nephrology (NBVN) (M. Couttenye and F. Schroven); French speaking Belgian Society of Nephrology (GNFB) (J.M. des Grottes and F. Collart); Renal Registry Bosnia and Herzegovina; Cyprus Renal Registry (A. Pastelli and L. Yioukas); Czech Republic: Registry of Dialysis Patients (RDP) (I. Rychlík and J. Potucek); Danish Nephrology Registry (DNS); Estonian Society of Nephrology (Ü. Pechter and K. Lilienthal); Finnish Registry for Kidney Diseases (J. Helve and H. Niemelä); France: The Epidemiology and Information Network in Nephrology (REIN) (C. Couchoud); Hellenic Renal Registry (G. Moustakas); Icelandic End-Stage Renal Disease Registry; Montenegro Renal Registry (M. Ratkovic and F. Tomović); Israel National Registry of Renal Replacement Therapy (L. Keinan-Boker and R. Dichtiar); Italian Registry of Dialysis and Transplantation (RIDT) (A. Limido, M. Nordio and M. Postorino); Kosovo Renal Registry (S. Selmani and M. Tolaj-Avdiu); Latvian Renal Registry (V. Kuzema, A. Popovam and A. Pētersons); Lithuanian Renal Registry (V. Vainauskas, I. Nedzelskiene and E. Žiginskiené); North Macedonian Renal Registry (O. Stojceva and R.I. Bushljetik); Norwegian Renal Registry (A.V. Reisæter); Portuguese Renal Registry (A. Ferreira); Romanian Renal Registry (RRR) (G. Mircescu, L. Garneata and E. Podgoreanu); Russian Renal Registry (A. Andrusev, H. Zakharova and N. Tomilina); Renal Registry in Serbia (M. Lausevic, R. Naumovic, all of the Serbian renal units and the Serbian Society of Nephrology); Slovakian Renal Registry (I. Lajdová, V. Spustová and M.J. Rosenberger); Spain Renal Registry (B. Mahillo Durán and M.O. Valentín Muñoz); Swedish Renal Registry (SRR) (K.G. Prütz, M. Evans, S. Schön, T. Lundgren, H. Rydell and M. Segelmark); Swiss Dialysis Registry (P. Ambühl and R. Guidotti); Dutch Renal Registry (RENINE) (L. Heuveling, S. Vogelaar and M. ten Dam); Registry of the Nephrology, Dialysis and Transplantation in Turkey (TSNNR) (K. Ateş and G. Süleymanlar); Ukrainian Renal Data System (URDS) (M. Kolesnyk, O. Razvazhaieva and N. Kozliuk); UK Renal Registry (all the staff of the UK Renal Registry and of the renal units submitting data); Scottish Renal Registry (SRR) (all of the Scottish renal units); and the regional registries of Andalusia (SICATA), Aragon (F. Arribas Monzón), Asturias (P. Beltrán, J.R. Quirós and RERCA Working Group), Basque country (UNIPAR) (Á. Magaz, J. Aranzabal, M. Rodrigo and I. Moina), Canary Islands (I. Santana Gil and C. Torres Medina), Cantabria, Castile and León (M.A. Palencia García), Castile-La Mancha (G. Gutiérrez Ávila and I. Moreno Alía), Catalonia (RMRC) (J. Comas and J. Tort), Community of Madrid (F. Tornero Molina), Extremadura [all the renal units (Nephrology and Dialysis)], Galicia, La Rioja (E. Huarte Loza and H. Hernández Vargas), Murcia (I. Marín Sánchez), Navarre (J. Manrique Escola and J. Arteaga Coloma) and Valencian region (O.L. Rodríguez-Arévalo).

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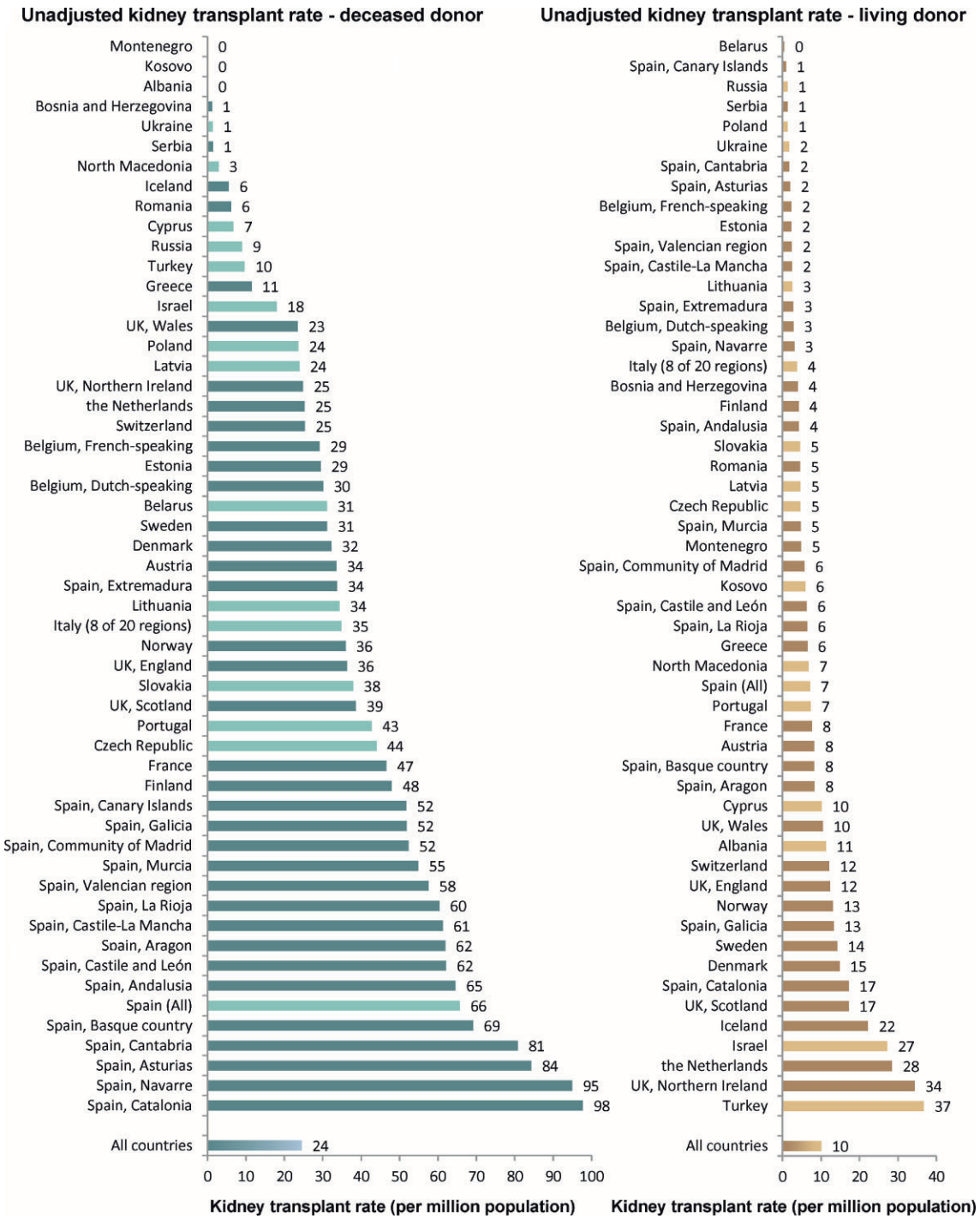

FIGURE 12: Deceased donor (left panel) and living donor (right panel) kidney transplants performed in 2019 p.m.p., by country or region, unadjusted. Registries providing individual patient data are shown as dark-coloured bars and registries providing aggregated data as light-coloured bars. The total count for Austria is based on residents and non-residents. For Romania and the Netherlands, the kidney transplant rate is underestimated by 30% and 2%, respectively. For Serbia, the transplant rate is underestimated by 16% for deceased donor transplants and by 12% for living donor transplants.

Table 3. Survival probabilities at 1, 2 and 5 years by treatment modality and cohort, from Day 1 of the start of RRT or dialysis, or from the day of first kidney transplantation

	Survival probabilities as percentage (95% CIs)				
	Cohort 2010–14			Cohort 2013–17	
Survival type	1 year	2 years	5 years	1 year	2 years
Patient survival on RRT					
Unadjusted	84.5 (84.4–84.7)	74.5 (74.3–74.8)	51.9 (51.6–52.1)	85.6 (85.4–85.7)	76.0 (75.8–76.2)
Adjusted[a]	87.3 (87.2–87.5)	78.2 (78.0–78.4)	54.1 (53.8–54.3)	88.1 (87.9–88.2)	79.3 (79.1–79.5)
Patient survival on dialysis					
Unadjusted	83.5 (83.3–83.6)	72.0 (71.8–72.2)	42.3 (42.1–42.6)	84.5 (84.3–84.7)	73.4 (73.2–73.6)
Adjusted[a]	85.7 (85.6–85.9)	75.5 (75.2–75.7)	47.4 (47.1–47.7)	86.9 (86.7–87.1)	77.1 (76.9–77.3)
Patient survival after first kidney transplantation (deceased donor)					
Unadjusted	96.2 (96.0–96.4)	94.0 (93.8–94.3)	86.6 (86.3–87.0)	96.3 (96.1–96.5)	94.2 (94.0–94.5)
Adjusted[b]	98.0 (97.8–98.1)	96.7 (96.6–96.9)	92.3 (92.0–92.6)	98.0 (97.9–98.2)	96.9 (96.7–97.1)
Graft survival after first kidney transplantation (deceased donor)					
Unadjusted	90.7 (90.4–91.0)	87.6 (87.3–88.0)	77.7 (77.3–78.1)	91.3 (91.0–91.6)	88.3 (88.0–88.6)
Adjusted[b]	92.6 (92.3–92.9)	90.0 (89.7–90.4)	81.6 (81.2–82.0)	93.2 (92.9–93.4)	90.7 (90.4–91.0)
Patient survival after first kidney transplantation (living donor)					
Unadjusted	99.1 (98.9–99.2)	98.1 (97.9–98.4)	94.4 (93.9–94.8)	98.9 (98.7–99.0)	98.1 (97.8–98.3)
Adjusted[b]	99.2 (99.1–99.4)	98.4 (98.2–98.7)	95.1 (94.7–95.6)	99.1 (98.9–99.2)	98.4 (98.2–98.7)
Graft survival after first kidney transplantation (living donor)					
Unadjusted	96.8 (96.4–97.1)	95.1 (94.6–95.4)	88.6 (88.0–89.1)	96.7 (96.4–97.0)	95.3 (94.9–95.7)
Adjusted[b]	96.6 (96.2–96.9)	94.8 (94.3–95.2)	87.9 (87.3–88.5)	96.5 (96.2–96.8)	95.0 (94.6–95.4)

The findings are based on data from the following renal registries providing individual patient data: Austria, Belgium (Dutch-speaking), Belgium (French-speaking), Bosnia and Herzegovina, Denmark, Finland, France, Greece, Iceland, Norway, Spain (Andalusia), Spain (Aragon), Spain (Asturias), Spain (Basque country), Spain (Cantabria), Spain (Castile and León), Spain (Castile-La Mancha), Spain (Catalonia), Spain (Community of Madrid), Spain (Extremadura), Spain (Galicia), Spain (Murcia), Spain (Valencian Region), Sweden, the Netherlands, the UK (England/Northern Ireland/Wales) and the UK (Scotland).

Unadjusted survival probabilities were calculated using the Kaplan–Meier method, and adjusted survival probabilities using the Cox regression model.

[a]Analyses were adjusted using fixed values: age (67 years), sex (63% men) and primary renal disease (24% diabetes mellitus, 19% hypertension/renal vascular disease, 11% glomerulonephritis and 46% other causes).

[b]Analyses were adjusted using fixed values: age (50 years), sex (63% men) and primary renal disease (14% diabetes mellitus, 10% hypertension/renal vascular disease, 23% glomerulonephritis and 53% other causes).

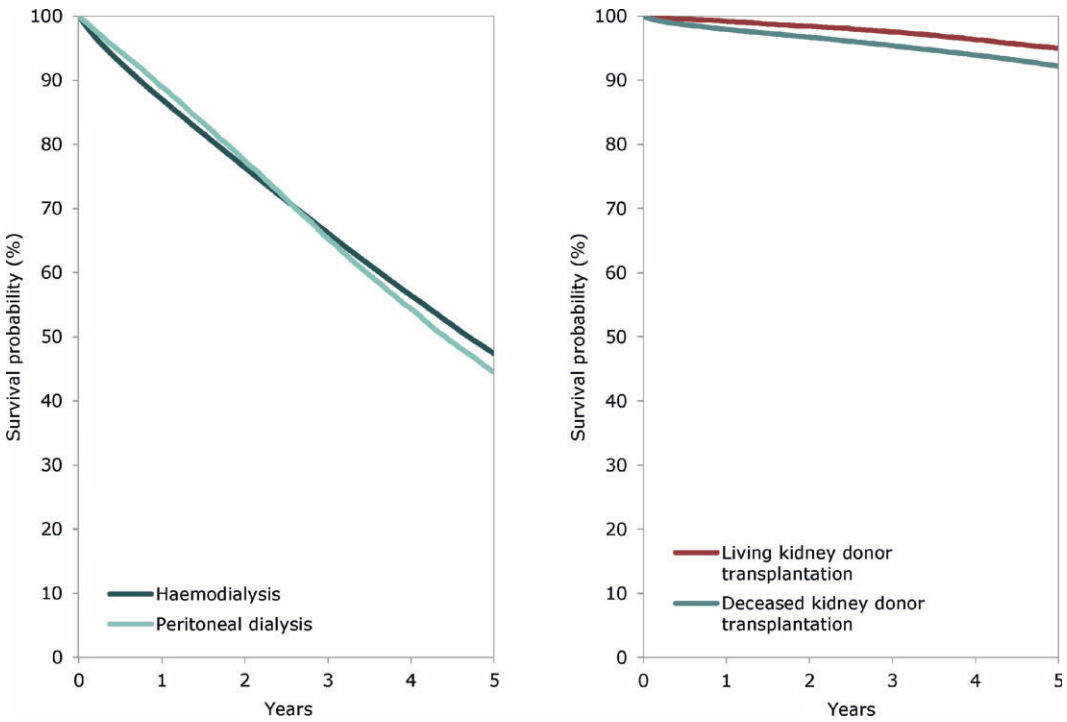

FIGURE 13: Survival of patients starting HD and PD between 2010 and 2014 from Day 91 (left panel) and patients receiving a first kidney transplant from a living or deceased donor between 2010 and 2014 (right panel). Survival on dialysis was censored for kidney transplantation and adjusted using fixed values for age (67 years), sex (63% men) and primary renal disease (24% diabetes mellitus, 19% hypertension/renal vascular disease, 11% glomerulonephritis and 46% other causes). Survival after kidney transplantation was adjusted using fixed values for age (50 years), sex (63% men) and primary renal disease (14% diabetes mellitus, 10% hypertension/renal vascular disease, 23% glomerulonephritis and 53% other causes). These figures are based on the data from the following registries providing individual patient data: Austria, Belgium (Dutch-speaking), Belgium (French-speaking), Bosnia and Herzegovina, Denmark, Finland, France, Greece, Iceland, Norway, Spain (Andalusia), Spain (Aragon), Spain (Asturias), Spain (Basque country), Spain (Cantabria), Spain (Castile and León), Spain (Castile-La Mancha), Spain (Catalonia), Spain (Community of Madrid), Spain (Extremadura), Spain (Galicia), Spain (Murcia), Spain (Valencian Region), Sweden, the Netherlands, the UK (England/Northern Ireland/Wales) and the UK (Scotland).

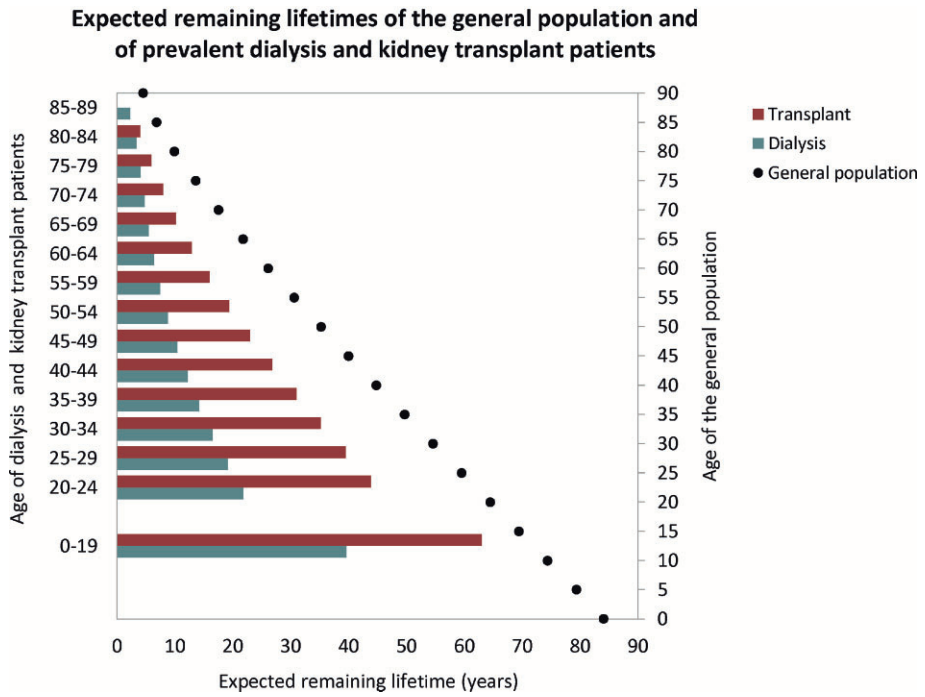

FIGURE 14: Expected remaining lifetime of prevalent dialysis and kidney transplant patients (cohort 2015–19) and the general population (cohort 2015–19), by age. This figure is based on data from the following registries providing individual patient data: Austria, Belgium (Dutch-speaking), Belgium (French-speaking), Bosnia and Herzegovina, Denmark, Finland, France, Greece, Iceland, Norway, Spain (Andalusia), Spain (Aragon), Spain (Asturias), Spain (Basque country), Spain (Cantabria), Spain (Castille and León), Spain (Castille-La Mancha), Spain (Catalonia), Spain (Community of Madrid), Spain (Extremadura), Spain (Galicia), Spain (Murcia), Spain (Valencian Region), Sweden, the Netherlands, the UK (England/Northern Ireland/Wales) and the UK (Scotland).

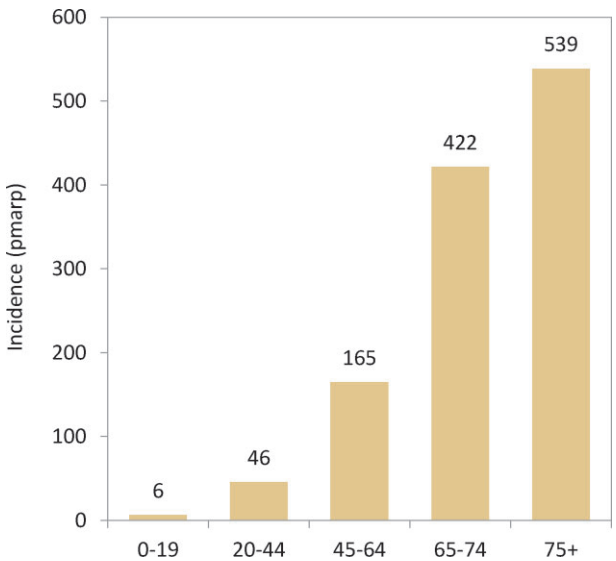

FIGURE 15: Incidence of RRT per million age-related population (p.m.a.r.p.) in 2019, on Day 1, by age, unadjusted. Results are based on data from registries providing individual patient data.

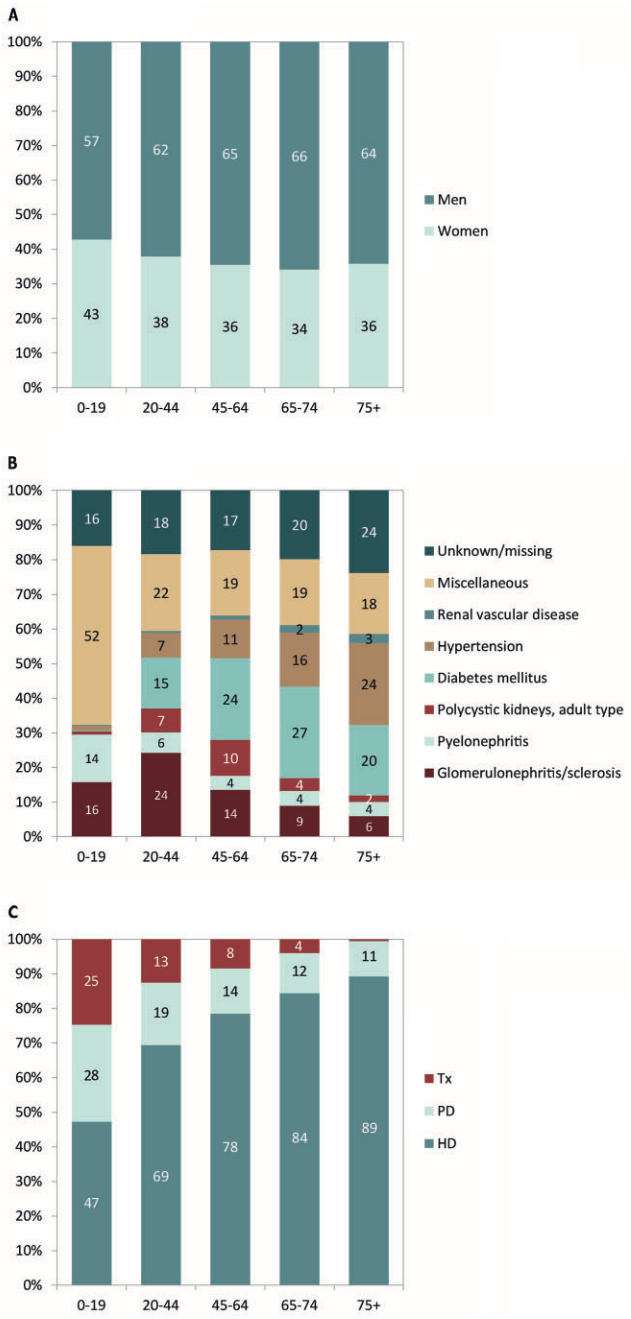

FIGURE 16: (A) Sex, (B) primary renal disease and (C) treatment modality distribution by age in incident patients accepted for RRT in 2019, on Day 1, unadjusted. Results are based on data from registries providing individual patient data. HD, haemodialysis; PD, peritoneal dialysis; Tx, kidney transplant.

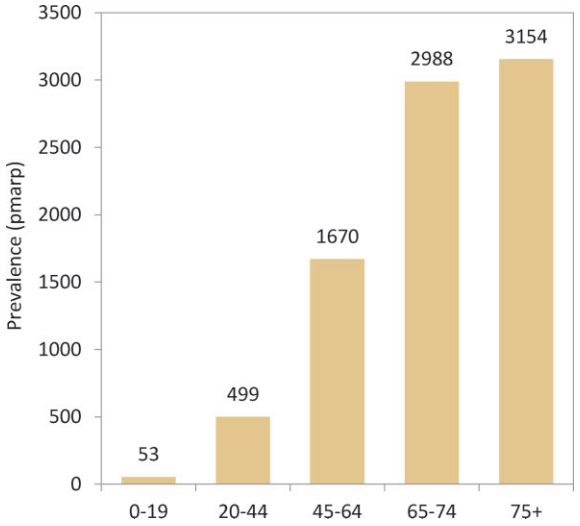

FIGURE 17: Prevalence of RRT per million age-related population (p.m.a.r.p.) on 31 December 2019, by age, unadjusted. Results are based on data from registries providing individual patient data.

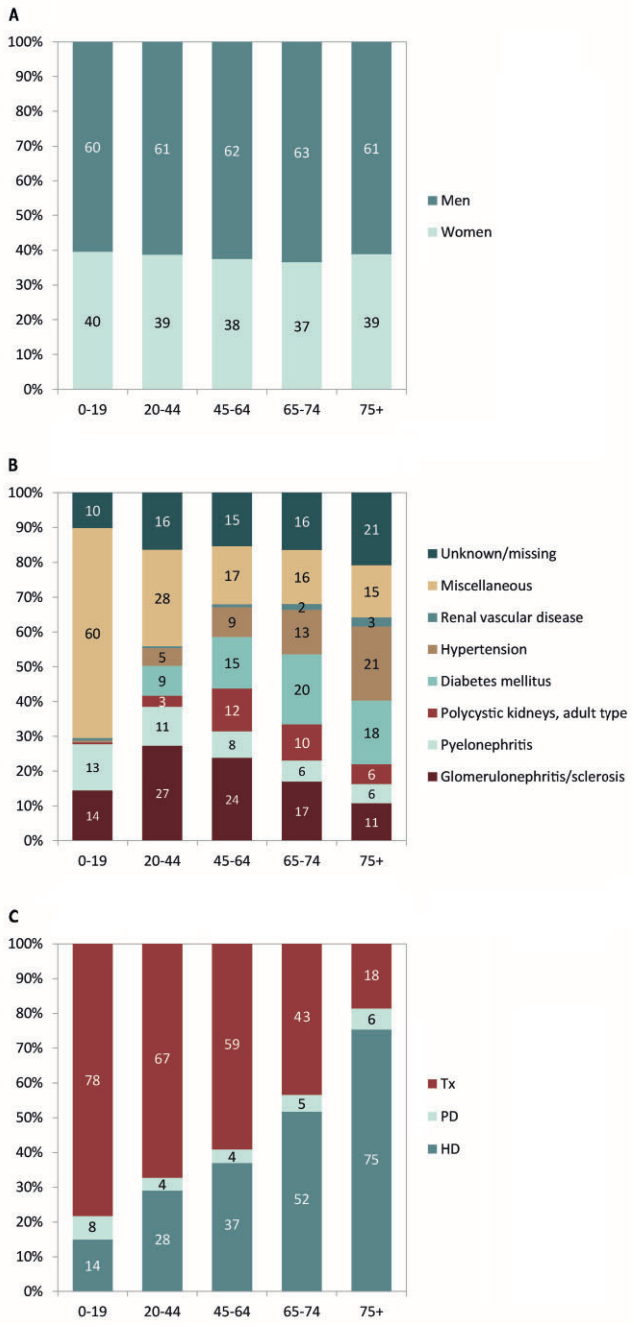

FIGURE 18: (A) Sex, (B) primary renal disease and (C) treatment modality distribution by age in prevalent patients on 31 December 2019, unadjusted. Results are based on data from registries providing individual patient data. HD, haemodialysis; PD, peritoneal dialysis; Tx, kidney transplant.

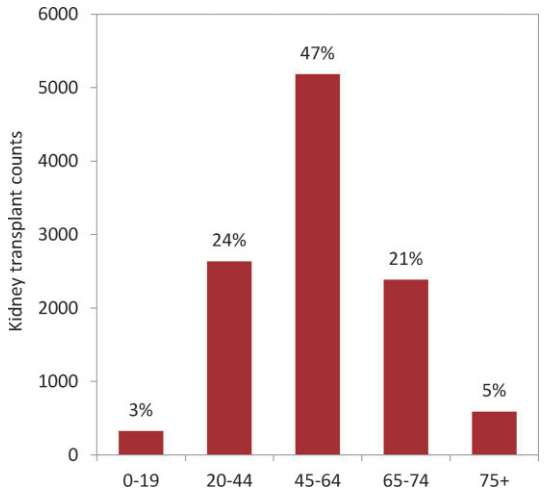

FIGURE 19: Kidney transplant counts and percentages by recipient age in 2019, unadjusted. Results are based on data from registries providing individual patient data. The percentages in this figure sum up to 100% for all age groups together.

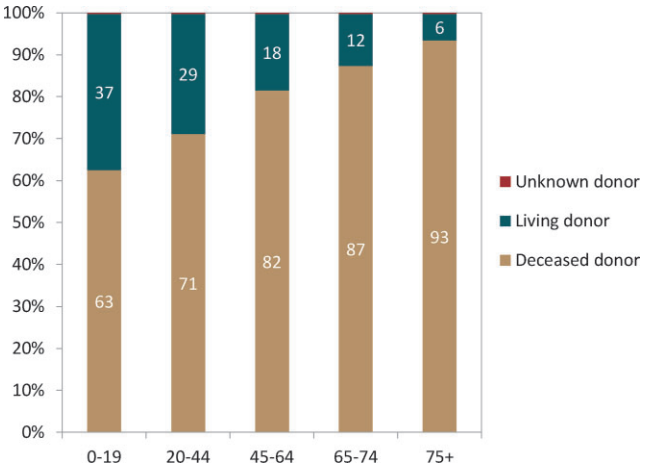

FIGURE 20: Donor type distribution by age in kidney transplant recipients, unadjusted. Results are based on data from registries providing individual patient data.

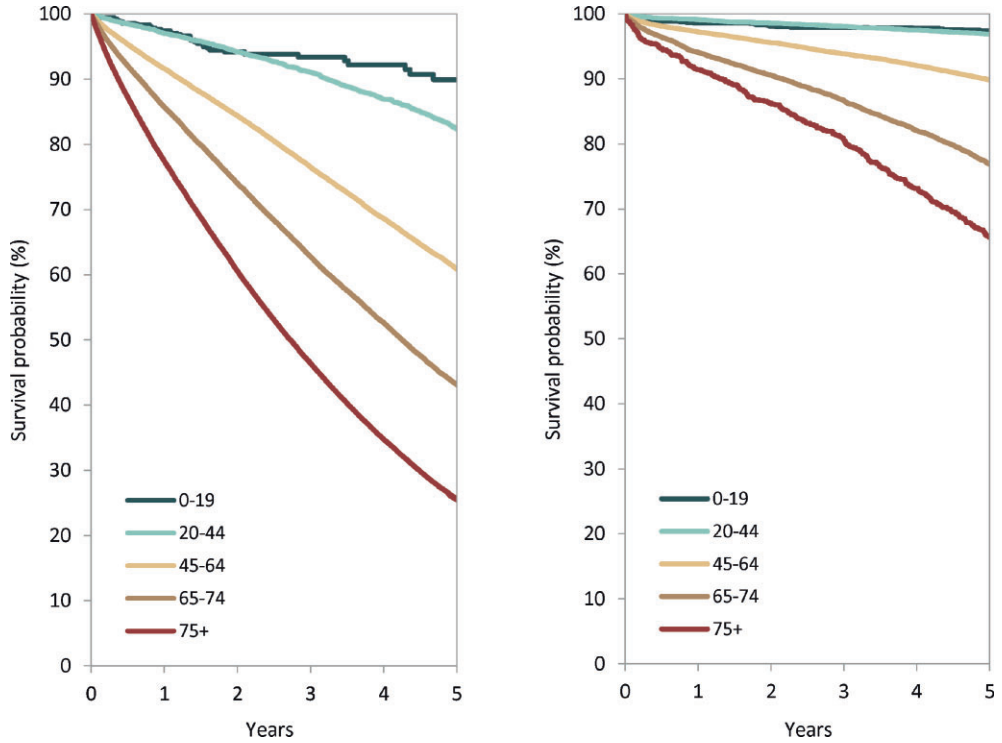

FIGURE 21: Patient survival probability by age for incident dialysis patients from Day 91 (left panel) and for patients receiving a first kidney transplant from the day of transplantation (right panel), adjusted for sex and primary renal disease. Results are based on data from registries providing individual patient data.

SUPPLEMENTARY DATA

Supplementary data are available at *ckj* online.

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CONFLICT OF INTEREST STATEMENT

A.O. is the CKJ Editor-in-Chief.

APPENDIX 1.

Countries or regions providing individual patient data to the ERA Registry: Austria, Dutch-speaking Belgium, French-speaking Belgium, Bosnia and Herzegovina, Denmark, Estonia, Finland, France, Greece, Iceland, Montenegro, Norway, Romania, Serbia, Sweden, Switzerland, the Netherlands, the UK, England/Northern Ireland/Wales and the UK, Scotland, and the Spanish regions of Andalusia, Aragon, Asturias, Basque country, Canary Islands, Cantabria, Castile and León, Castile-La Mancha, Catalonia, Community of Madrid, Extremadura, Galicia, La Rioja, Murcia, Navarre and Valencian region.

Countries or regions providing aggregated data to the ERA Registry: Albania, Belarus, Cyprus, Czech Republic, Israel, Italy, Kosovo, Latvia, Lithuania, North Macedonia, Poland, Portugal, Russia, Slovakia, Spain, Turkey and Ukraine.

Countries not providing data to the ERA Registry: Andorra, Armenia, Azerbaijan, Bulgaria, Croatia, Georgia, Germany, Hungary, Ireland, Liechtenstein, Luxembourg, Malta, Moldova, Monaco, San Marino and Slovenia.

Countries part of the European Union (EU-28) population in 2015 (used as reference population): Austria,

Belgium, Bulgaria, Czech Republic, Croatia, Cyprus, Denmark, Germany, Estonia, Greece, Finland, France, Italy, Ireland, Latvia, Lithuania, Luxembourg, Hungary, Malta, the Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, Spain, Sweden and the UK.

APPENDIX 2.

Miscellaneous primary renal disease: Nephropathy (interstitial) due to analgesic drugs, nephropathy (interstitial) due to *cis*-platinum, nephropathy (interstitial) due to cyclosporin A, lead-induced nephropathy (interstitial), drug-induced nephropathy (interstitial) not mentioned above, cystic kidney disease—type unspecified, polycystic kidneys; infantile (recessive), medullary cystic disease; including nephronophtisis, cystic kidney disease—other specified type, hereditary/familial nephropathy—type unspecified, hereditary nephritis with nerve deafness (Alport's Syndrome), cystinosis, primary oxalosis, Fabry's disease, hereditary nephropathy—other specified type, renal hypoplasia (congenital)—type unspecified, oligomeganephronic hypoplasia, congenital renal dysplasia with or without urinary tract malformation, syndrome of agenesis of abdominal muscles (prune belly syndrome), renal vascular disease due to polyarteritis, Wegener's granulomatosis, ischaemic renal disease/cholesterol embolism, glomerulonephritis related to liver cirrhosis, cryoglobulinaemic glomerulonephritis, myelomatosis/light chain deposit disease, amyloidosis, lupus erythematosus, Henoch–Schoenlein purpura, Goodpasture's Syndrome, systemic sclerosis (scleroderma), haemolytic uraemic syndrome (including Moschcowitz syndrome), multisystem disease—other (not mentioned above), tubular necrosis (irreversible) or cortical necrosis (different from 88), tuberculosis, gout, nephrocalcinosis and hypercalcaemic nephropathy, Balkan nephropathy, kidney tumour, traumatic or surgical loss of kidney and other identified renal disorders.

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