

ORIGINAL ARTICLE

## The ERA Registry Annual Report 2021: a summary

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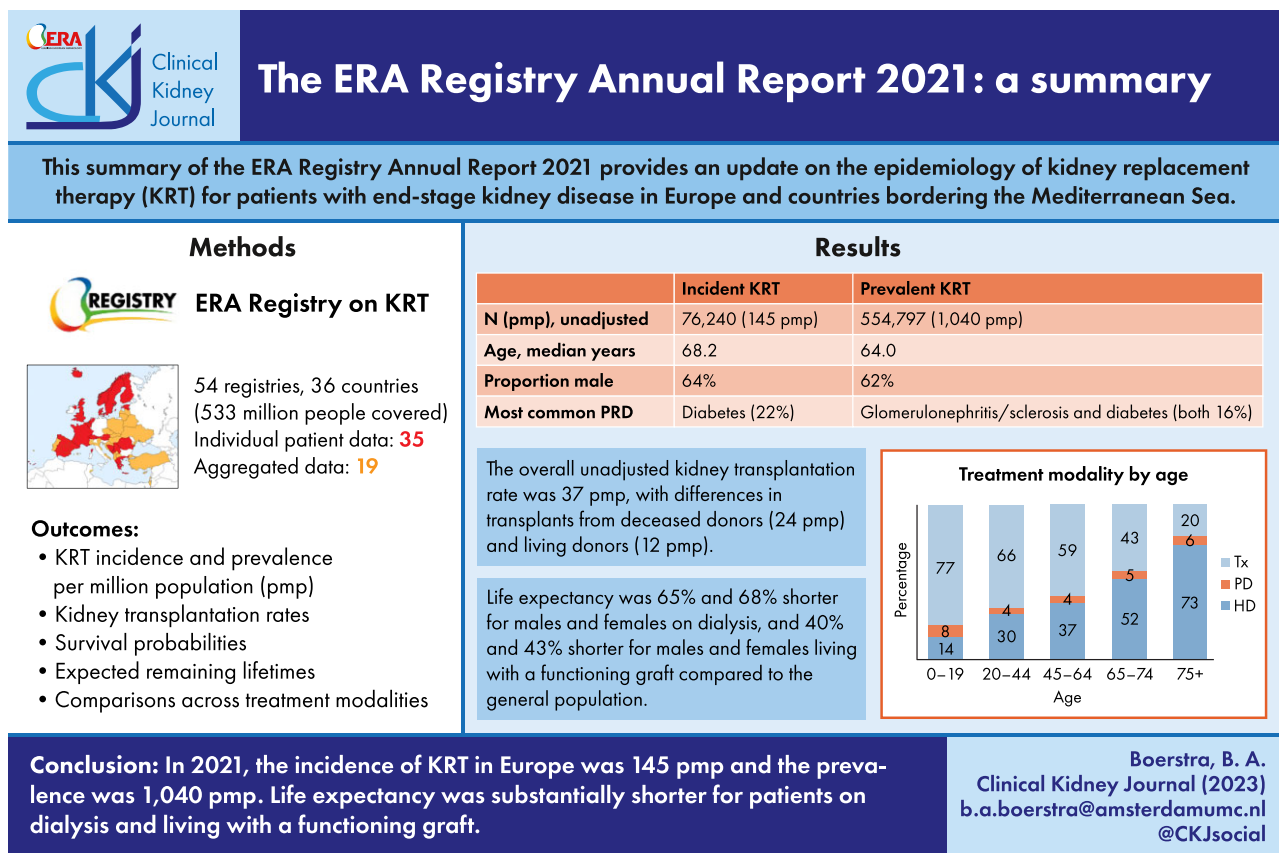
## ABSTRACT

**Background.** The European Renal Association (ERA) Registry collects data on kidney replacement therapy (KRT) in patients with end-stage kidney disease (ESKD). This paper is a summary of the ERA Registry Annual Report 2021, including a comparison across treatment modalities.

**Methods.** Data was collected from 54 national and regional registries from 36 countries, of which 35 registries from 18 countries contributed individual patient data and 19 registries from 19 countries contributed aggregated data. Using this data, incidence and prevalence of KRT, kidney transplantation rates, survival probabilities and expected remaining lifetimes were calculated.

**Result.** In 2021, 533.2 million people in the general population were covered by the ERA Registry. The incidence of KRT was 145 per million population (pmp). In incident patients, 55% were 65 years or older, 64% were male, and the most common primary renal disease (PRD) was diabetes (22%). The prevalence of KRT was 1040 pmp. In prevalent patients, 47% were 65 years or older, 62% were male, and the most common PRDs were diabetes and glomerulonephritis/sclerosis (both 16%). On 31 December 2021, 56% of patients received haemodialysis, 5% received peritoneal dialysis, and 39% were living with a functioning graft. The kidney transplantation rate in 2021 was 37 pmp, a majority coming from deceased donors (66%). For patients initiating KRT between 2012–2016, 5-year survival probability was 52%. Compared to the general population, life expectancy was 65% and 68% shorter for males and females receiving dialysis, and 40% and 43% shorter for males and females living with a functioning graft.

## GRAPHICAL ABSTRACT



**Keywords:** dialysis, ESKD, graft survival, kidney transplantation, patient survival



## INTRODUCTION

The European Renal Association (ERA) Registry Annual Report 2021 ([Supplementary information](#)) reports the latest data on the epidemiology of kidney replacement therapy (KRT) for patients with end-stage kidney disease (ESKD) in Europe and countries bordering the Mediterranean Sea. Data was provided by 54 national or regional renal registries from 36 countries, of which 35 registries from 18 countries contributed individual patient data and 19 registries from 19 countries contributed aggregated data (Appendix 1). The participating registries covered approximately 533.2 million people, corresponding to 61.4% of the total European population for incident results and 61.9% for prevalent results (due to a difference in available data for the Netherlands, Cyprus, and Hungary). The percentage coverage for this year was lower than the 76.8% covered in the 2020 Annual Report [1]. Compared to last year, aggregated data from Ukraine,

Latvia, and Tunisia was included while data from Russia could not be included.

This paper summarizes data from 2021 on the incidence and prevalence of KRT, kidney transplantation rates, and patient and graft survival. In addition, we will also present comparisons across treatment modalities [haemodialysis (HD), peritoneal dialysis (PD), and kidney transplantation (Tx)]. More detailed results and further information on the methodology used in analyses can be found in the ERA Registry 2021 Annual Report ([Supplementary information](#)).

## RESULTS

### KRT incidence

In 2021, 76 240 patients with ESKD out of a population of 525 million people initiated KRT (Table 1). This corresponds to an unadjusted KRT incidence rate of 145 per million population (pmp) or 1 in 6900 Europeans (Table 1), which was higher than the KRT incidence rate of 128 pmp in 2020 [1]. The unadjusted incidence rate ranged from 53 pmp in Ukraine (1 in 18 900 inhabitants) and 66 pmp in Serbia (1 in 15 200 inhabitants) to 279 in Greece and 283 pmp in Cyprus (approximately 1 in 3500 inhabitants, Table 1 and Figs 1 and 2). When adjusted for age and sex using the distribution of the European Union 28 countries (EU28) population [2],

Table 1: Summary: data on the unadjusted incidence of KRT in 2021 on day 1 by country or region, the mean and median age at the start of KRT, and the incidence of KRT in patients with DM as PRD.

Country/region	General population covered by the registry in thousands	Incidence of KRT in 2021 on day 1					
		All (n)	All (pmp)	Mean age (years)	Median age (years)	DM (n)	DM (pmp)
Albania	2784	383	138	63.6	67.0	89	32
Austria <sup>a</sup>	8825	1068	121	65.7	68.4	256	29
Belarus <sup>b</sup>	9256	707	76			147	16
Belgium, Dutch-speaking <sup>c</sup>	6687	1205	180	70.3	73.7	249	37
Belgium, French-speaking <sup>c</sup>	4899	1013	207	67.6	69.9	169	34
Bosnia and Herzegovina	3531	428	121	63.4	65.3	109	31
Croatia <sup>d</sup>	3306	437	132	68.8	70.0	119	36
Cyprus	905	256	283	69.0	72.0	112	124
Czech Republic <sup>d</sup>	10307	2505	243				
Denmark	5857	753	129	64.2	68.4	220	38
Estonia	1331	102	77	62.2	65.6	17	13
Finland	5541	455	82	61.3	66.2	146	26
France	67356	11416	169	67.7	71.0	2650	39
Greece	10569	2952	279	72.1	74.5	660	62
Iceland	373	32	86	57.7	67.7	7	19
Israel	9372	1877	200	66.5	69.8	797	85
Italy (7 of 20 regions)	20658	3299	160	68.8	71.8	409	20
Kosovo	1688	267	158	62.1	64.0	91	54
Latvia	1704	160	94	58.6	61.0	29	17
Lithuania	2811	274	97	60.4	62.6	46	16
Montenegro <sup>c</sup>	619	49	79	62.3	63.0	13	21
North Macedonia	2069	369	178	63.4	65.0	84	41
Norway	5403	530	98	64.1	67.3	87	16
Poland	38162	5570	146			1428	37
Portugal <sup>e</sup>	10348	2510	243			820	79
Romania	19122	3319	174	62.2	64.8	334	17
Serbia	6493	428	66	59.9	64.0	68	10
Slovakia <sup>d</sup>	4452	828	186	63.5	66.0	285	64
Spain (All)	47385	7135	151	64.0	68.5	1766	37
Spain, Andalusia	8511	1271	149	64.8	67.8	311	37
Spain, Aragon	1323	161	122	65.7	68.0	56	42
Spain, Asturias	1010	155	154	67.9	70.1	38	38
Spain, Basque country	2181	298	137	65.9	69.4	80	37
Spain, Canary Islands	2248	391	174	64.7	67.5	128	57
Spain, Cantabria <sup>c</sup>	584	87	149	66.9	70.1	21	36
Spain, Castile and León	2383	314	132	67.6	70.5	68	29
Spain, Castile-La Mancha <sup>c</sup>	2049	268	131	67.1	68.6	74	36
Spain, Catalonia	7763	1481	191	66.6	69.6	320	41
Spain, Community of Madrid	6751	850	126	64.3	66.9	236	35
Spain, Extremadura	1060	149	141	66.3	69.0	35	33
Spain, Galicia	2694	451	167	67.4	70.6	113	42
Spain, La Rioja	316	39	123	64.0	64.1	12	38
Spain, Murcia	1518	221	146	64.3	67.3	55	36
Spain, Navarre <sup>c</sup>	658	82	125	62.8	64.9	22	33
Spain, Valencian region	5058	816	161	66.1	69.3	163	32
Sweden	10416	1175	113	64.1	68.7	297	29
Switzerland	8452	725	86	65.7	69.2	136	16
the Netherlands	16130	1934	120	63.3	66.8	404	25
Tunisia, Sfax region <sup>d</sup>	1023	235	230	59.8	62.0	81	79
Turkey <sup>f</sup>	84680	12661	150			2275	50
Ukraine <sup>b</sup>	26632	1411	53	54.0	56.0	289	11
UK, England	55349	6570	119	60.7	63.3	1692	31
UK, Northern Ireland	1905	241	127	64.3	66.7	52	27
UK, Scotland	5480	602	110	60.4	63.0	172	31
UK, Wales	3105	359	116	60.2	63.4	112	36
All countries	524985	76240	145	65.0	68.2	16717	36

DM, diabetes mellitus; PRD, primary renal disease.

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

<sup>a</sup>The incidence is underestimated by approximately 1% due to one haemodialysis centre not submitting data.

<sup>b</sup>Patients younger than 18 years of age are not reported.

<sup>c</sup>Patients younger than 20 years of age are not reported.

<sup>d</sup>Data includes dialysis patients only.

<sup>e</sup>Data on primary renal disease are available for dialysis patients only (N = 2495, 99.1% of total).

<sup>f</sup>Data on DM are extrapolated from data of 6774 patients (53.3% of total).

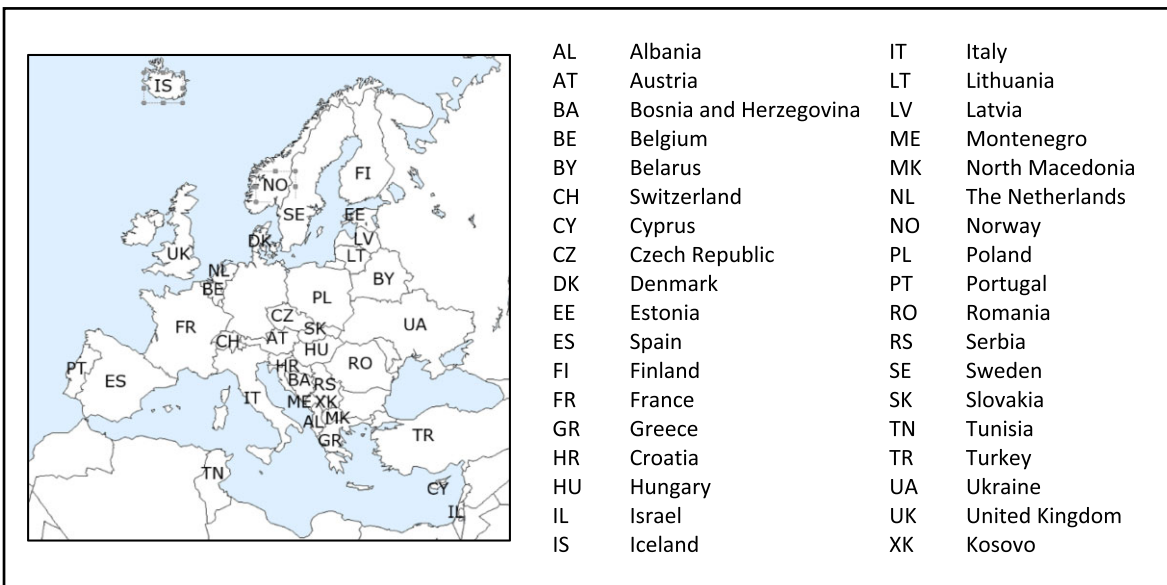
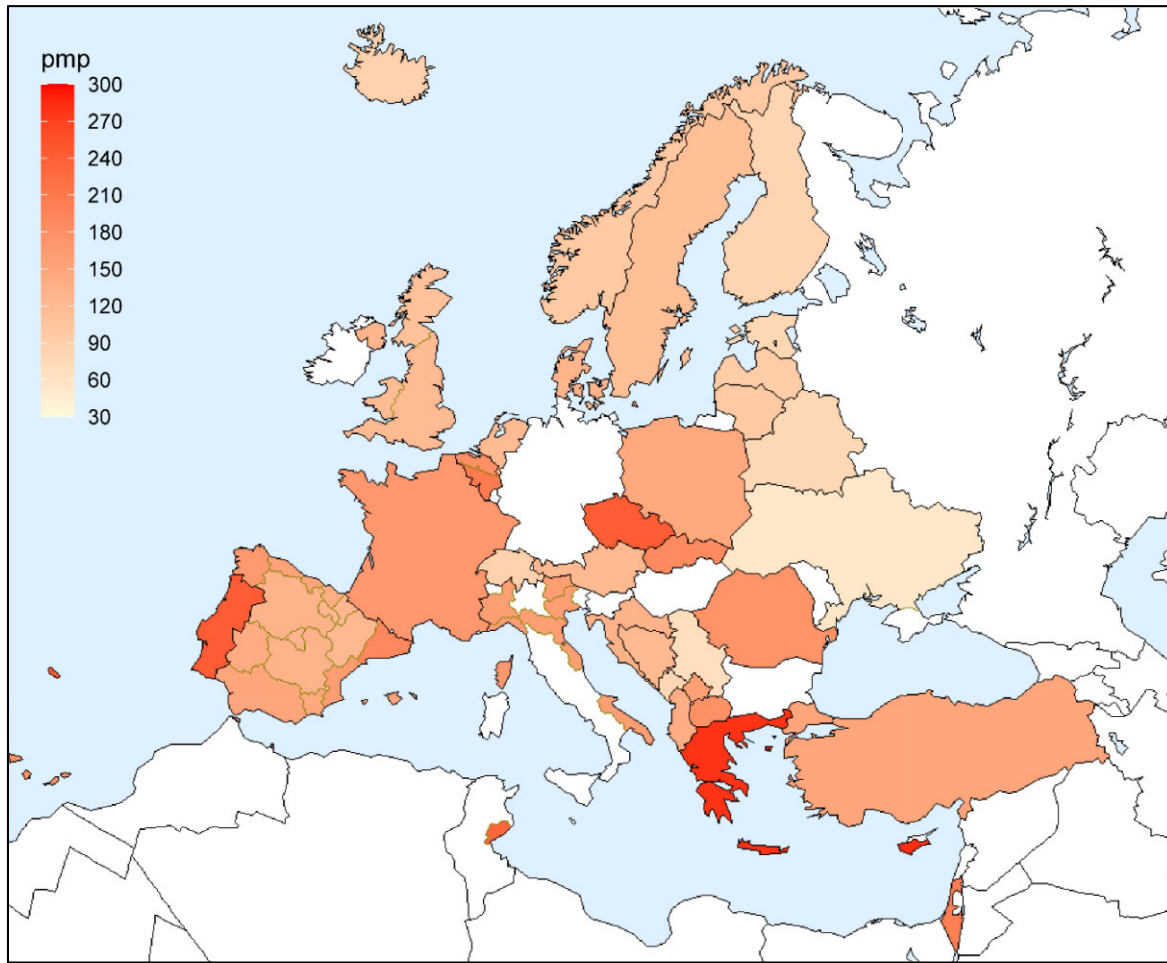
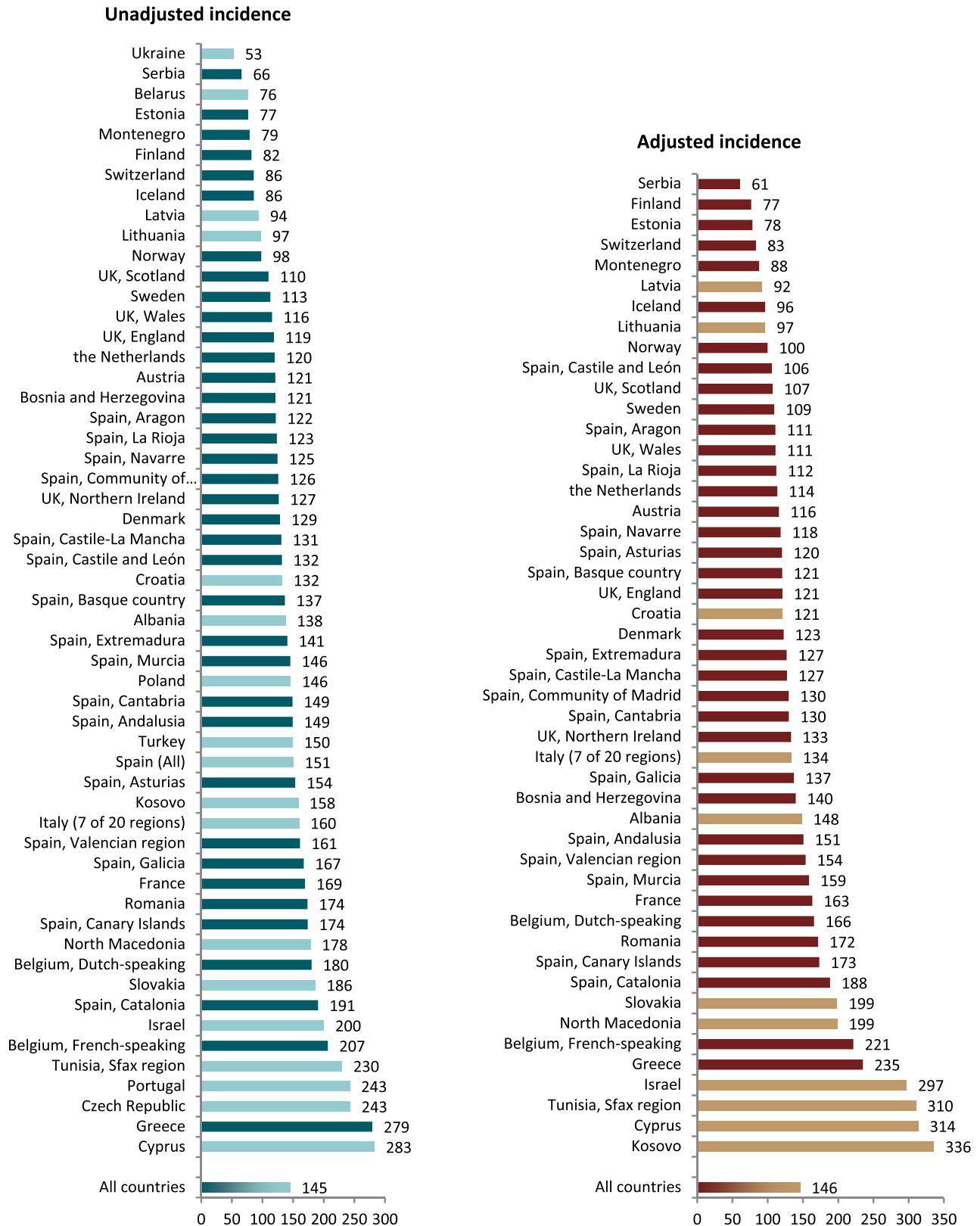


Figure 1: Incidence per million population of KRT in 2021 on day 1 by country or region, unadjusted.



**Figure 2:** Incidence per million population of KRT in 2021 on day 1 by country or region, unadjusted (left panel) and adjusted (right panel). Registries providing individual patient data are shown as dark bars and registries providing aggregated data as light bars. See Appendix 1 for a list of countries and regions providing individual patient or aggregated data. Adjustment was performed by standardizing the incidence to the age and sex distribution of the EU28 population.

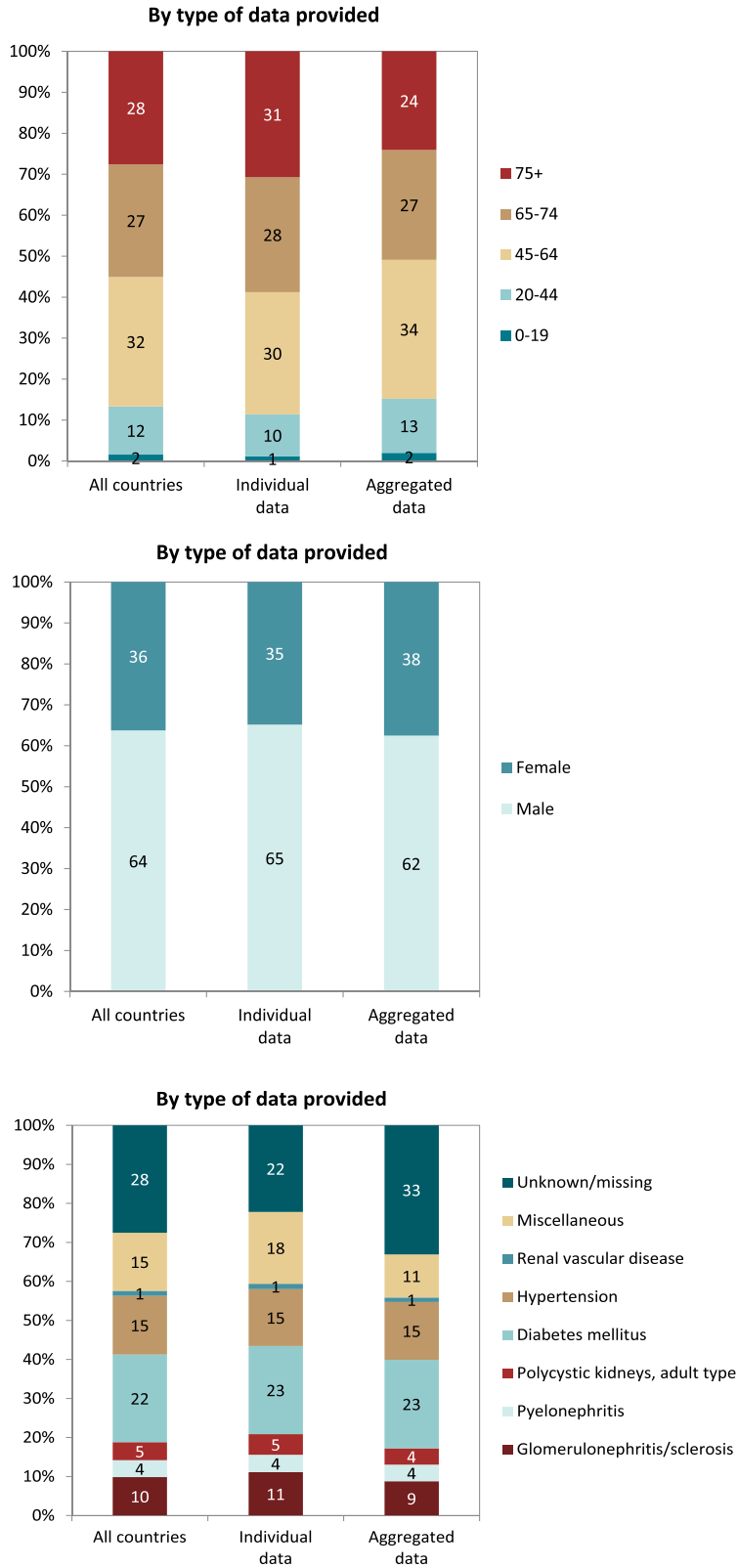
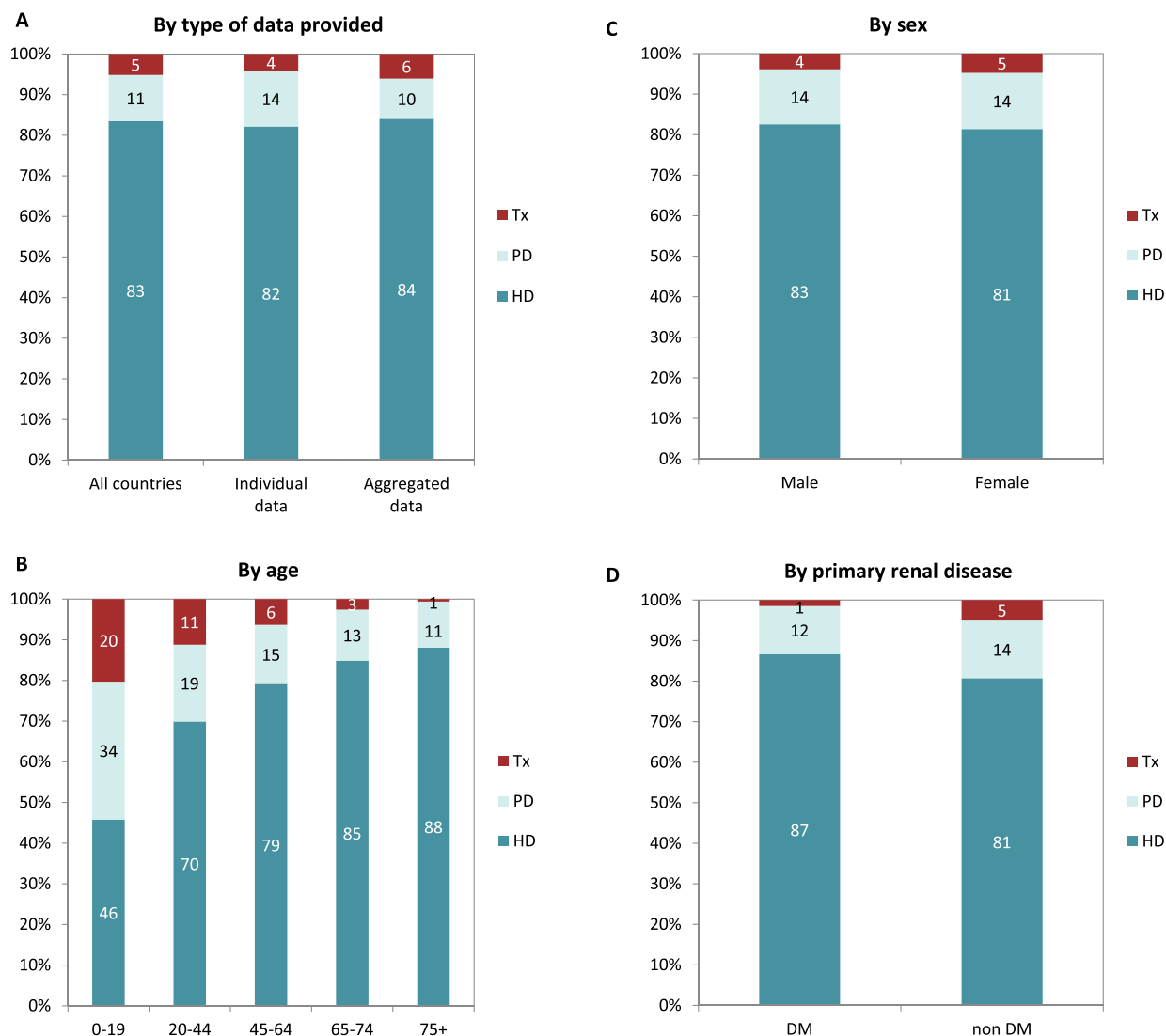


Figure 3: Distribution of (A) age, (B) sex, and (C) primary renal disease by type of data provided for incident patients accepted for KRT in 2021 on day 1, unadjusted.



**Figure 4:** Distribution of treatment modality by (A) type of data provided, (B) age, (C) sex, and (D) primary renal disease (DM and non-DM) for incident patients accepted for KRT in 2021 on day 1, unadjusted. Panels (B), (C), and (D) 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 or aggregated data. HD: haemodialysis; PD: peritoneal dialysis; Tx: transplant.

the overall adjusted KRT incidence rate for the available 48 countries and regions was 146 pmp or approximately 1 in 6800 Europeans (Fig. 2). The adjusted incidence rate ranged from 61 pmp in Serbia (1 in 16 400 inhabitants) to 336 pmp in Kosovo (1 in 3000 inhabitants, Fig. 2). The median age of patients starting KRT was 68.2 years, ranging from 56.0 years in Ukraine to 74.5 years in Greece (Table 1). In incident patients, 55% were aged 65 years or older, 64% were male, and the most common PRD was diabetes mellitus (DM) (22%, Fig. 3). On the first day of KRT, 83% received HD, 11% received PD, and 5% underwent pre-emptive kidney transplantation, with only minor differences between countries providing individual patient data versus aggregated data (Fig. 4). For countries providing individual patient data, initial treatment modality varied among age categories, with HD increasing in a step-wise manner from 46% HD in the age category 0–19 years to 88% HD in the age category 75 years or older (Fig. 4). On the contrary, PD and transplantation decreased from 34% and 20% in the age category 0–19 years to 11% and 1% in the

age category 75 years or older, respectively (Fig. 4). The distribution of treatment modalities was similar for men and women (Fig. 4). Patients with DM as PRD received a pre-emptive kidney transplant less frequently compared to patients with a different PRD (1% versus 5%, Fig. 4). On day 91 after the start of KRT, 83% of all incident patients were receiving HD, 13% were receiving PD, and 4% had undergone kidney transplantation (Fig. 5), which is similar to previous years.

### KRT prevalence

On 31 December 2021, 554 797 patients with ESKD were receiving KRT, corresponding to a KRT prevalence of 1040 pmp or 1 in 950 Europeans (Table 2). The unadjusted prevalence ranged from 304 pmp in Ukraine (1 in 3300 inhabitants) and 434 pmp in Montenegro (1 in 2300 inhabitants) to 1556 pmp in Canary Islands, Spain (1 in 650 inhabitants) and 2003 pmp



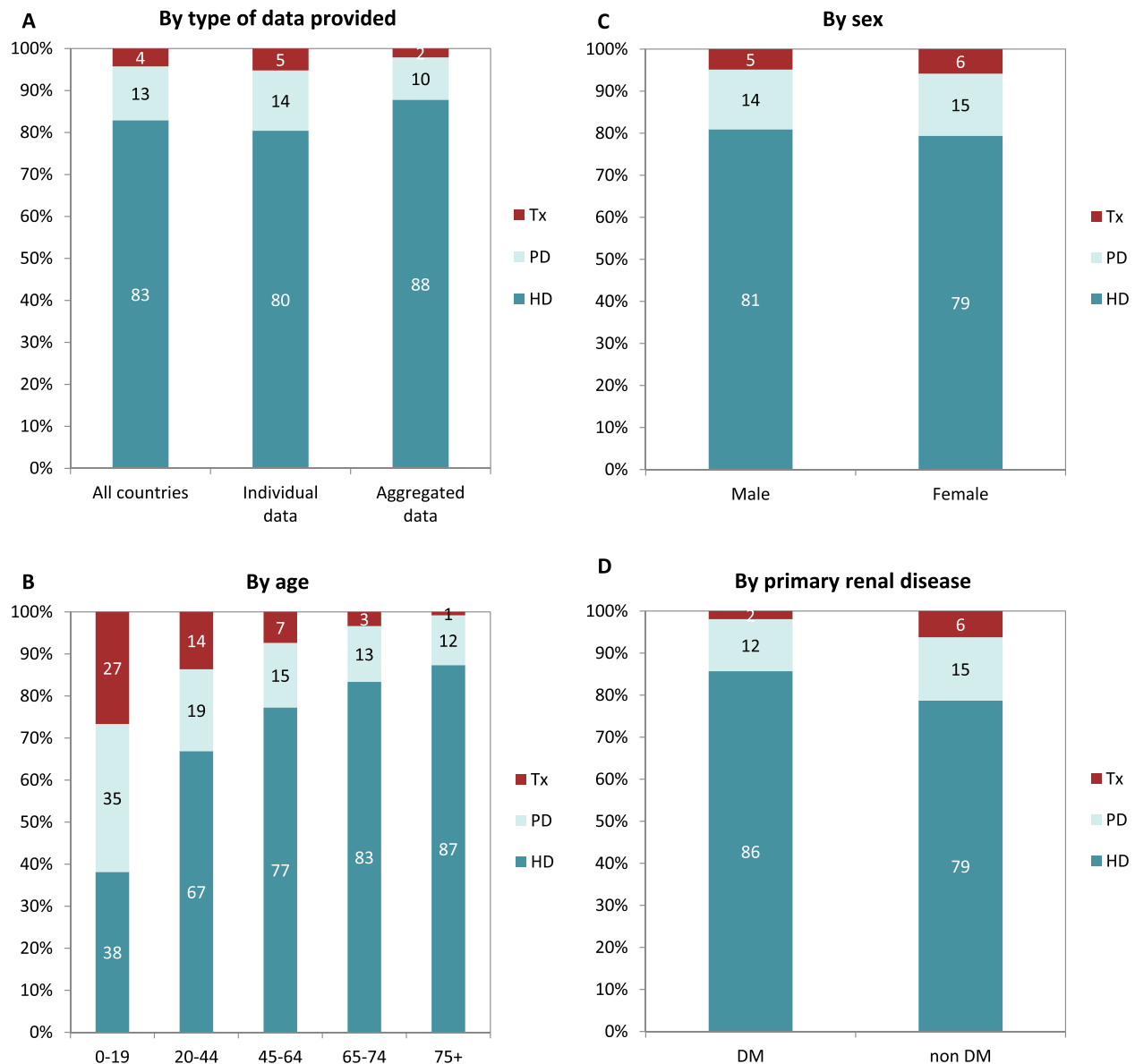


Figure 5: Distribution of treatment modality by (A) type of data provided, (B) age, (C) sex, and (D) primary renal disease (DM and non-DM) for incident patients accepted for KRT in 2021 on day 91, unadjusted. Panels (B), (C), and (D) are only based on the data from registries providing individual patient data. See Appendix 1 for a list of countries and regions providing individual patient or aggregated data. HD: haemodialysis; PD: peritoneal dialysis; Tx: transplant.

in Portugal (1 in 500 inhabitants, Table 2 and Figs 6 and 7). When adjusted for age and sex using the EU28 distribution [2], the overall adjusted KRT prevalence rate for the available 47 countries and regions was 1107 pmp or approximately 1 in 900 Europeans (Fig. 7). The adjusted prevalence ranged from 458 pmp in Montenegro (1 in 2200 inhabitants) and 586 pmp in Croatia (1 in 1700 inhabitants) to 1518 pmp in the Canary Islands, Spain and 1546 pmp in Murcia, Spain (approximately 1 in 650 inhabitants, Fig. 7). The median age of prevalent patients was 64 years, ranging from 54 years in Ukraine to 70 years in Croatia and Israel, although the latter two countries only provided data on dialysis patients (Table 2). In prevalent patients, 47% were aged 65 years or older, 62% were male, and the most common PRDs were DM and glomerulonephritis/sclerosis (both 16%, Fig. 8). While there was almost no difference in

the distribution of age and sex between countries providing individual patient versus aggregated data, the distribution of PRD varied by type of data provided, which was likely due to the higher proportion of missing or unknown PRDs for countries providing aggregated data (Fig. 8). Additionally, there was a larger proportion of patients living with a functioning graft in countries providing individual data (47%) compared to countries providing aggregated data (33%, Fig. 9). For countries providing individual patient data, the distribution of treatment modalities was almost equal for men and women (47–48% received HD; 5% received PD; 47% received Tx, Fig. 9). However, the distribution of treatment modalities across age groups varied widely, with the largest contrast between the youngest and oldest age groups. In paediatric patients aged 0–19 years, 77% of patients were living with a functioning graft while in patients aged 75 years and

older, only 20% were living with a functioning graft (Fig. 9). Lastly, only 29% of patients with DM as PRD were living with a functioning graft compared to 51% of patients with a different PRD (Fig. 9).

### Kidney transplantation

In 2021, 19 568 kidney transplantations were performed. The unadjusted kidney transplantation rate was 37 pmp or 1 in 27 000 Europeans (Fig. 10), which was higher than in 2020 (28 pmp) [1] but comparable to data from 2019 (35 pmp) [3]. The unadjusted kidney transplantation rate ranged from 2 pmp in Serbia, Romania, and Tunisia (1 in 500 000 inhabitants) to 96 pmp in Spain, Catalonia (1 in 10 400 inhabitants) and 110 pmp in Spain, Cantabria (1 in 9 100 inhabitants, Fig. 10). A majority (66%) of kidney transplantations were from deceased donors (DD), while 33% were from living donors (LD), and 1% had an unknown donor type (Fig. 10). Two regions in Spain (La Rioja and Navarre) had all kidney transplants come from deceased donors while Montenegro, Albania, and Kosovo had all kidney transplants come from living donors (Fig. 10). The overall unadjusted DD kidney transplantation rate was twice that from LD (DD: 24 pmp or 1 in 41 700 inhabitants versus LD: 12 pmp or 1 in 83 300 inhabitants), and was highest in Spain, Cantabria (108 pmp or 1 in 9300 inhabitants, Fig. 11). The highest rate of LD kidney transplantations was in Israel (37 pmp or 1 in 27 000 inhabitants, Fig. 11). In countries providing individual patient data, 78% of kidney transplants came from DD compared to 58% in countries providing aggregated data (Fig. 12).

### Survival probability of patients receiving KRT

For patients initiating KRT between 2012 and 2016, the unadjusted 5-year patient survival probability was 51.7% [95% confidence interval (95% CI) 51.4–51.9, Table 3]. In patients starting dialysis, the unadjusted 5-year survival probabilities were 41.4% (95% CI 41.1–41.7), while in patients receiving a first kidney transplant, 5-year survival was 85.8% (95% CI 85.4–86.1) for DD and 94.2% (95% CI 93.8–94.6) for LD (Table 3). The unadjusted 5-year probability of graft survival was higher in LD kidney transplantations (88.3%; 95% CI 87.7–88.8) compared to DD kidney transplantations (77.0%; 95% CI 76.6–77.5, Table 3). Similar trends were observed when analyses were adjusted using fixed values for age, sex, and PRD (Table 3).

### Expected remaining lifetime

In the period from 2017 to 2021, life expectancy for all age groups combined was approximately 65% and 68% shorter for males and females on dialysis, and 40% and 43% shorter for males and females living with a functioning graft when compared to males and females in the general population (Fig. 13). In males aged 20 to 24 years, life expectancy was on average 36 years (63%) shorter if receiving dialysis, and 16 years (27% shorter) if living with a functioning graft when compared to males from the general population. In females aged 20 to 24 years, this was 42 years (68%) shorter on dialysis and 19 years (31%) shorter if living with a functioning graft. However, as age increased, the absolute gap in expected remaining lifetime between patients on dialysis and patients living with a functioning graft decreased. In males aged 70 to 74 years, the difference in expected remaining lifetime was 9 years (65%) if on dialysis and 6 years (45%) if living with a functioning graft, and in females this was 11 years (68%) if on dialysis and 8 years (50%) if living with a functioning graft.

### Comparisons by treatment modality

In this year's annual report, additional comparisons across treatment modalities are presented. In 2021, the rate of pre-emptive kidney transplantation was low (8 pmp or 1 in 125 000 Europeans) compared to PD (16 pmp or 1 in 62 500 Europeans) and HD (121 pmp or 1 in 8300 Europeans, Fig. 14). The percentage of pre-emptive kidney transplantations in incident patients ranged from 0% to 16% and was highest in Turkey, Northern Ireland, and the Netherlands (Fig. 15). In countries providing individual patient data, the distribution of age varied across treatment modalities. Among patients starting KRT with HD, a greater proportion was aged 65 years or older (62%) when compared to PD (52%) and pre-emptive transplantation (23%, Fig. 16). Among pre-emptively transplanted patients, 44% of patients were 45–64 years of age (Fig. 16). The distribution of sex across initial treatment modality was similar, but there were substantial differences in the distribution of PRD. Most notably, among patients initiating KRT with dialysis, the proportion of patients with hypertension or DM as PRD was triple that of pre-emptively transplanted patients (hypertension: HD and PD 15%; Tx 5%; and DM: HD 24%; PD 21%; Tx 8%, Fig. 16). Alternatively, in pre-emptively transplanted patients, the proportion of patients with polycystic kidneys and glomerulonephritis/sclerosis as PRD was higher (polycystic kidney disease: HD 4%; PD 7%; Tx 16%; and glomerulonephritis/sclerosis: HD 10%; PD 16%; Tx 18%, Fig. 16).

On 31 December 2021, HD was the most prevalent treatment modality for patients on KRT (580 pmp or 1 in 1700 Europeans), followed by transplantation (471 pmp or 1 in 2100 Europeans) and PD (50 pmp or 1 in 20 000 Europeans, Fig. 17). The highest prevalence of kidney transplantation was found in Norway, Northern Ireland, and several Spanish regions (Fig. 18). In countries providing individual patient data, patients aged 65 years and older comprised 62% of all HD patients, 55% of all PD patients, and 33% of all transplanted patients (Fig. 19). There was no difference in the distribution of sex across treatment modalities (Fig. 19). However, similar to the trends observed in incident patients, there were considerable differences in the distribution of PRD across dialysis patients and transplanted patients (Fig. 19). Among patients receiving dialysis, the proportion of hypertension or DM as PRD was double that of patients living with a functioning graft (hypertension: HD and PD 15%; Tx 7%; and DM: HD 22%; PD 19%; Tx 10%, Fig. 19). In contrast, the proportion of patients with polycystic kidneys and glomerulonephritis/sclerosis as PRD was considerably higher in transplanted patients (polycystic kidney disease: HD 6%; PD 7%; Tx 13%; and glomerulonephritis/sclerosis: HD 14%; PD 16%; Tx 25%, Fig. 19).

Using data on patients starting dialysis during the period 2012–2016, patients receiving PD on day 91 had a comparable survival probability to those receiving HD (Fig. 20), with a 5-year unadjusted patient survival of 41.4% (95% CI 41.1–41.7) in HD patients and 42.4% (95% CI 41.6–43.2) in PD patients. In patients receiving a first kidney transplant, both the unadjusted patient and graft survival was higher in patients receiving a kidney from a LD compared to patients receiving a kidney from a DD (Figs 21 and 22).

### AFFILIATED REGISTRIES

We would like to thank the patients and the staff of the dialysis and transplant units for contributing the data via their national and regional renal registries. Furthermore, we gratefully acknowledge the following registries and persons for their

Table 2: Summary: data on the unadjusted prevalence of KRT on 31 December 2021 by country or region, the mean and median age on 31 December 2021, and the prevalence of KRT in patients with DM as PRD.

Country/region	General population covered by the registry in thousands	Prevalent patients on KRT in 2021					
		All (n)	All (pmp)	Mean age (years)	Median age (years)	DM (n)	DM (pmp)
Albania	2784	1680	604	57.4	61.0	380	137
Austria <sup>a</sup>	8825	8977	1017	62.2	63.8	1695	192
Belarus <sup>b</sup>	9256	4063	439			496	54
Belgium, Dutch-speaking <sup>c</sup>	6687	8640	1292	66.5	68.4	1393	208
Belgium, French-speaking <sup>c</sup>	4899	6829	1394	65.7	67.5	1182	241
Bosnia and Herzegovina	3531	2400	680	59.7	61.5	419	119
Croatia <sup>d</sup>	3306	2140	647	66.9	70.0	520	157
Czech Republic	10307	11613	1127				
Denmark	5857	5794	989	59.5	61.0	991	169
Estonia	1331	1100	826	59.8	61.0	203	153
Finland	5541	5309	958	60.2	62.8	1307	236
France	67356	93098	1382	63.5	65.8	15388	228
Greece	10569	15277	1445	66.2	68.2	2752	260
Hungary	9731	9091	934	62.0	64.0		
Iceland	373	314	843	58.5	59.9	35	94
Israel <sup>d</sup>	9372	7042	751	67.8	70.0	3245	346
Italy (7 of 20 regions)	20658	25100	1215	62.9	64.9	2512	122
Kosovo <sup>b</sup>	1688	927	549	60.7	62.0	237	140
Latvia	1704	1023	600	55.8	58.0	111	65
Lithuania	2811	2405	856				
Montenegro <sup>c</sup>	619	269	434	59.8	62.5	48	78
North Macedonia	2069	1634	790	59.4	61.0	270	131
Norway	5403	5503	1019	60.4	62.3	738	137
Poland <sup>d</sup>	38162	19416	509			5391	141
Portugal <sup>e</sup>	10348	20731	2003	68.3		3721	553
Romania	19122	22650	1184	63.8	65.7	2078	109
Serbia	6493	5644	869	61.6	63.9	993	153
Slovakia <sup>d</sup>	4452	3463	778	64.9	67.0	1082	243
Spain (All)	47385	65678	1386	61.3	64.8	10796	228
Spain, Andalusia	8511	11312	1329	61.8	63.0	1898	223
Spain, Aragon	1323	1939	1466	65.7	67.3	355	268
Spain, Asturias	1010	1477	1463	64.9	66.5	266	263
Spain, Basque country	2181	2856	1309	62.6	64.7	383	176
Spain, Canary Islands	2248	3499	1556	63.0	64.2	916	407
Spain, Cantabria <sup>c</sup>	584	687	1176	63.9	65.0	115	197
Spain, Castile and León <sup>c</sup>	2383	3274	1374	66.3	67.4	540	227
Spain, Castile-La Mancha <sup>c</sup>	2049	2545	1242	64.1	64.8	449	219
Spain, Catalonia	7763	11841	1525	63.6	65.4	1822	235
Spain, Community of Madrid	6751	7850	1163	62.3	63.8	1366	202
Spain, Extremadura	1060	1419	1339	63.8	64.5	235	222
Spain, Galicia	2694	4057	1506	64.1	65.5	709	263
Spain, La Rioja	316	382	1209	62.4	63.0	55	174
Spain, Murcia	1518	2192	1444	62.9	63.9	352	232
Spain, Navarre <sup>c</sup>	658	930	1413	63.9	65.5	159	241
Spain, Valencian region	5058	7650	1512	63.8	65.6	1125	222
Sweden	10416	10499	1008	60.5	62.5	1782	171
Switzerland	8452	8512	1007	62.9	65.0	1224	145
the Netherlands	16832	17975	1068	61.3	63.3	2378	141
Tunisia, Sfax region <sup>d</sup>	1023	1063	1039	57.5	59.0	247	241
Turkey <sup>f</sup>	84680	84128	993			5842	340
Ukraine <sup>b</sup>	26632	8086	304	52.8	54.0	1304	49
UK, England	55349	55870	1009	58.3	59.6	10032	181
UK, Northern Ireland	1905	2062	1083	58.8	59.8	293	154
UK, Scotland	5480	5488	1001	57.1	59.0	954	174
UK, Wales	3105	3304	1064	58.4	59.7	611	197
All countries	534512	554797	1040	62.2	64.0	82650	186

DM, diabetes mellitus; PRD, primary renal disease.

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

<sup>a</sup>The prevalence is underestimated by approximately 1% due to one haemodialysis centre not submitting data.

<sup>b</sup>Patients younger than 18 years of age are not reported.

<sup>c</sup>Patients younger than 20 years of age are not reported.

<sup>d</sup>Data on prevalence includes dialysis patients only.

<sup>e</sup>Data on DM are extrapolated from data of 13473 patients (65.0% of total).

<sup>f</sup>Data on DM are extrapolated from data of 17074 patients (20.2% of total).

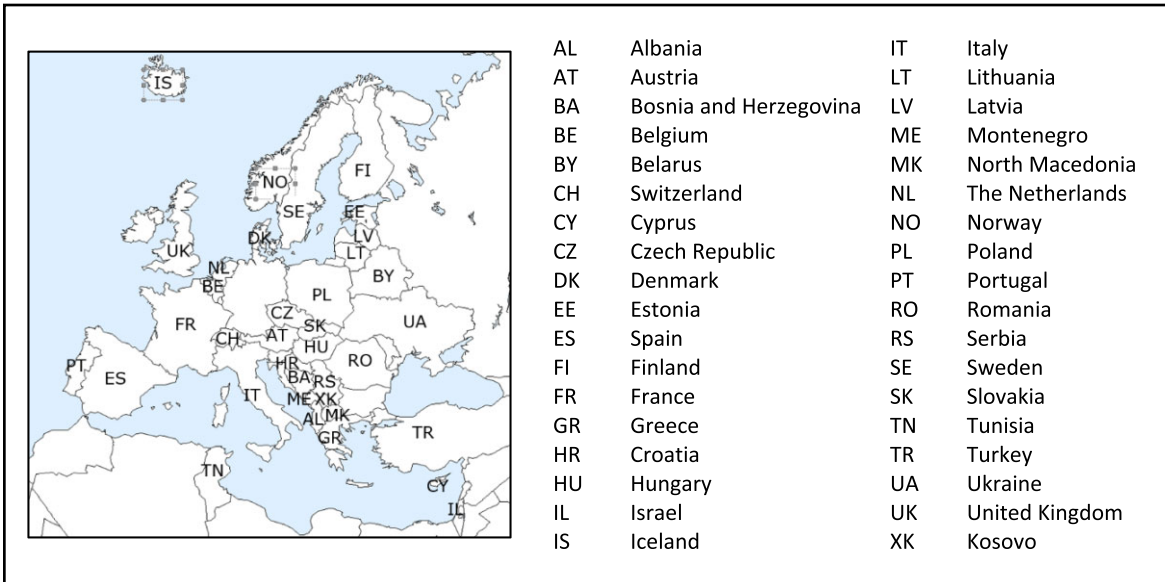
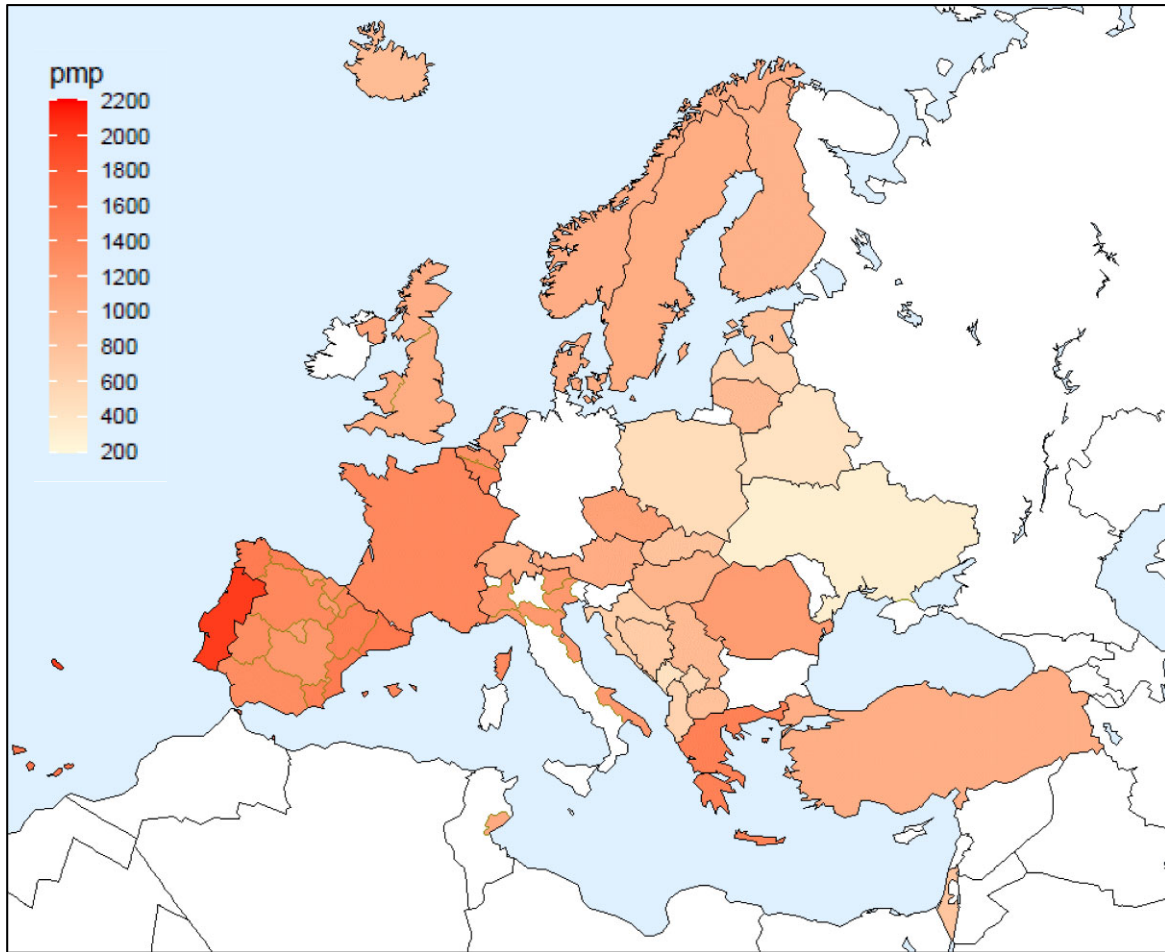


Figure 6: Prevalence per million population of KRT on 31 December 2021 by country or region, unadjusted.

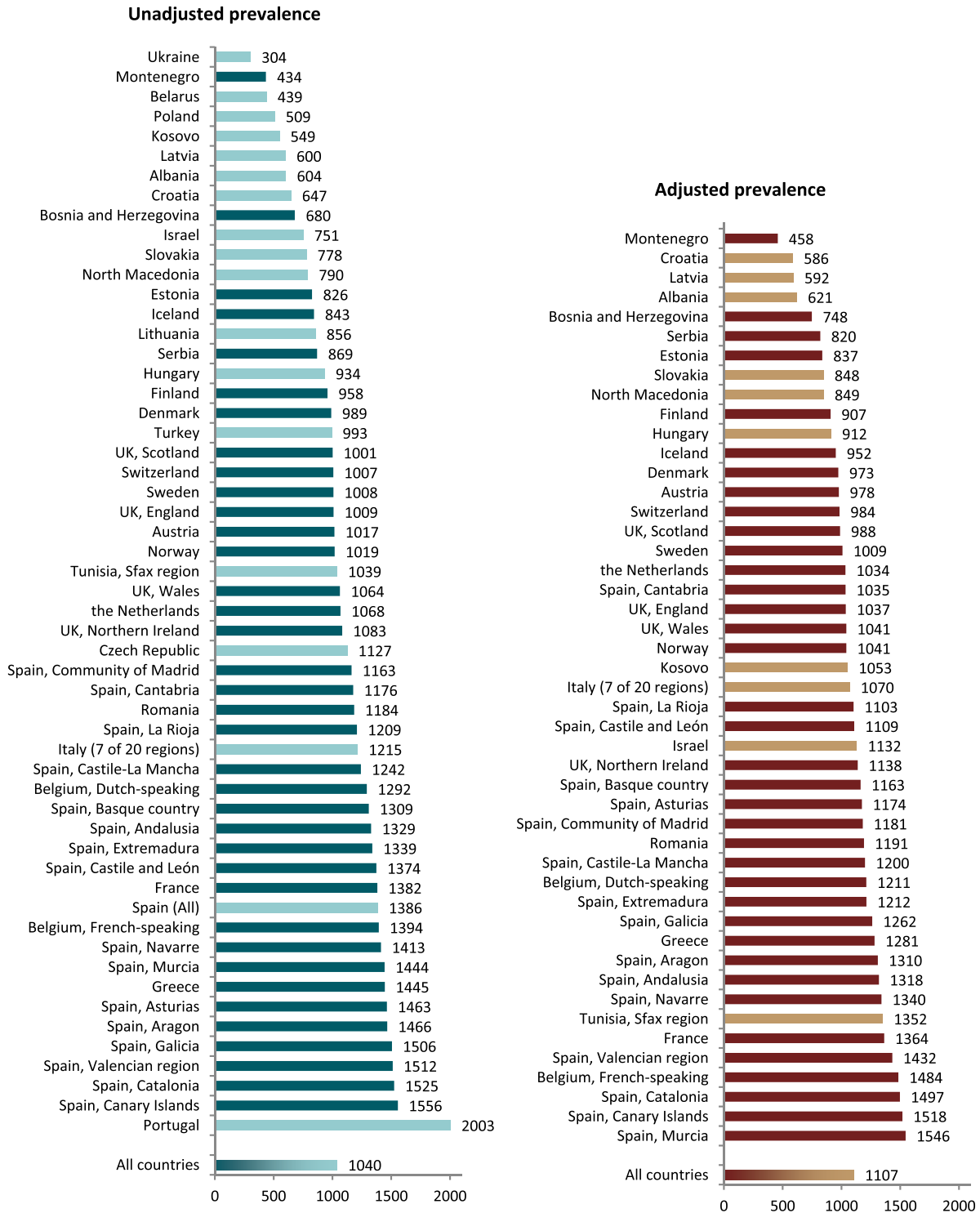


Figure 7: Prevalence per million population of KRT on 31 December 2021 by country or region, unadjusted (left panel) and adjusted (right panel). Registries providing individual patient data are shown as dark bars and registries providing aggregated data as light bars. See Appendix 1 for a list of countries and regions providing individual patient or aggregated data. Adjustment was performed by standardizing the incidence to the age and sex distribution of the EU28 population.

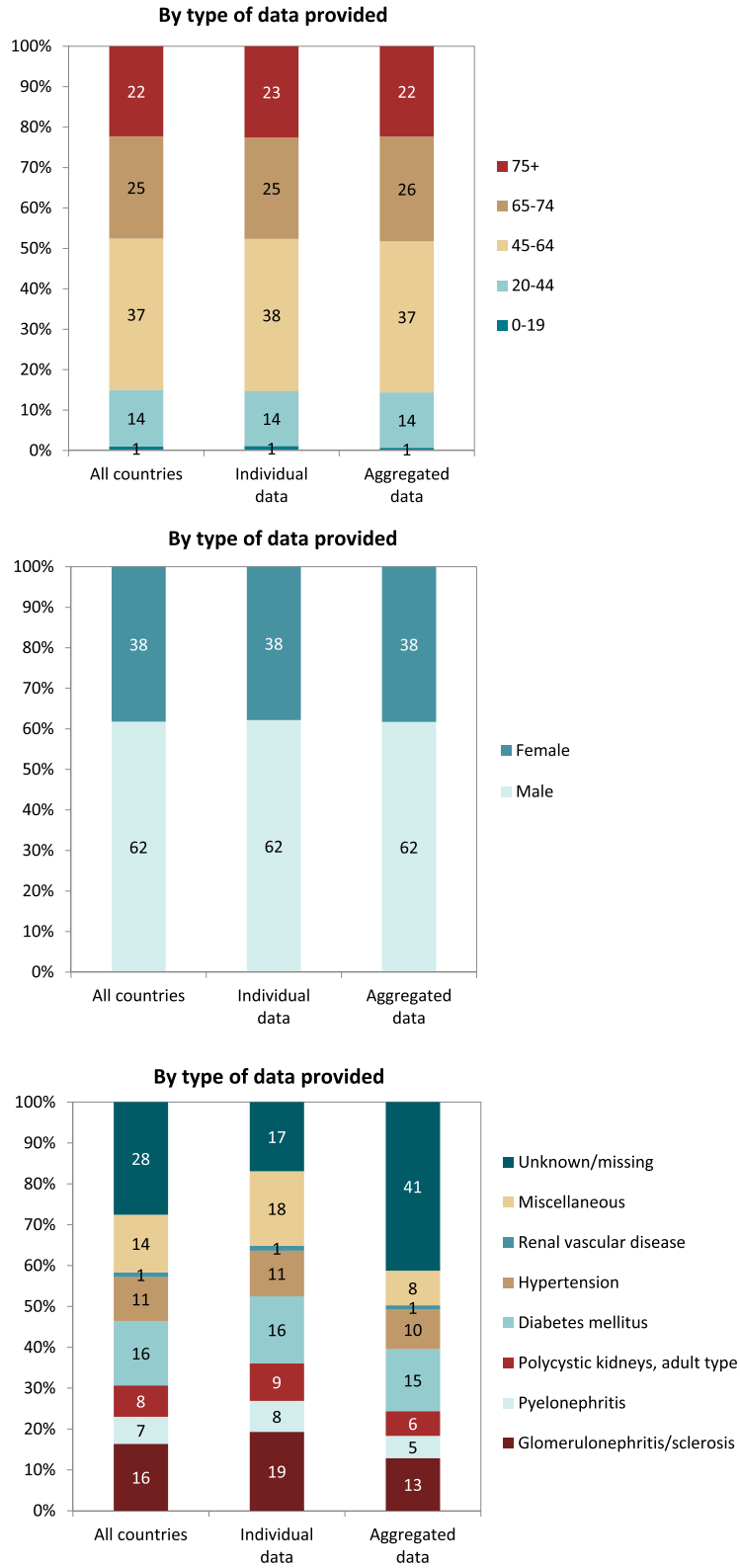


Figure 8: Distribution of (A) age, (B) sex, and (C) primary renal disease by type of data provided for prevalent patients on KRT on 31 December 2021, unadjusted. See Appendix 1 for a list of countries and regions providing individual patient or aggregated data.

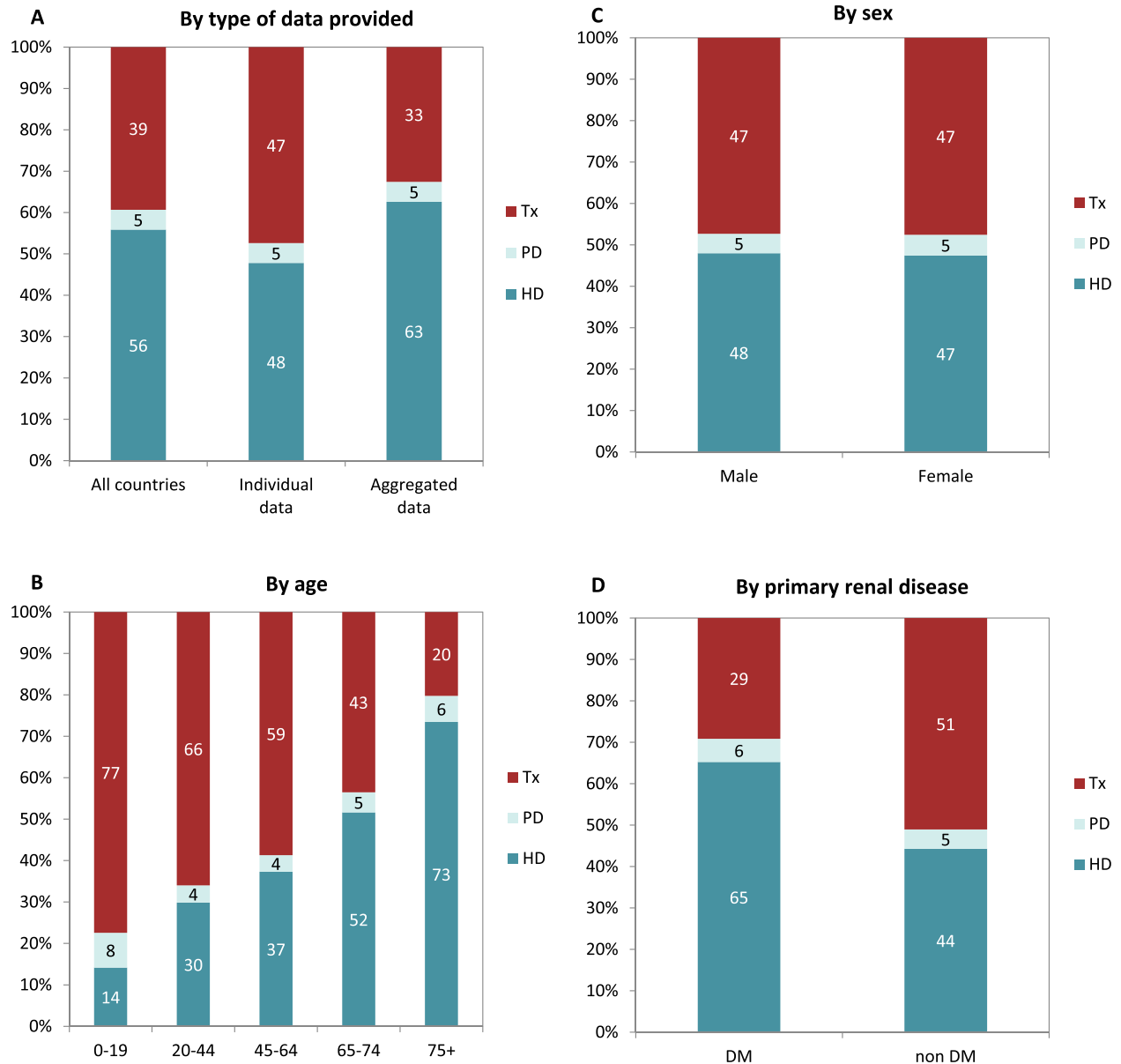


Figure 9: Distribution of treatment modality by (A) type of data provided, (B) age, (C) sex, and (D) primary renal disease (DM and non-DM) for prevalent patients on KRT on 31 December 2021, unadjusted. Panels (B), (C), and (D) are only based on the data from registries providing individual patient data. See Appendix 1 for a list of countries and regions providing individual patient or aggregated data. HD: haemodialysis; PD: peritoneal dialysis; Tx: transplant.

contribution of the data: Albanian Renal Registry (M. Rroji and E. Likaj); Austrian Dialysis and Transplant Registry [OEDTR] (D. Kaiser-Feistmantl, L. Buchwinkler, and G. Mayer); Belarus Renal Registry (K.S. Kamisarau and A. Kalachyk); Dutch speaking Belgian Society of Nephrology [NBVN] (L. Heylen and V. De Meyer); French speaking Belgian Society of Nephrology [GNFB] (M. des Grottes and F. Collart); Renal Registry Bosnia and Herzegovina (B. Jakovljevic and Z. Kelava); Croatian Renal Registry (D. Katicic and K. Altabas); Cyprus Renal Registry (S. Glyki, E. Magiroudi, and A. Savvidou); Czech Republic: Registry of Dialysis Patients [RDP] (F. Lopot, I. Rychlík, and L. Francová); Dan-

ish Nephrology Registry [DNS]; Estonian Society of Nephrology (Ü. Pechter and K. Lilienthal); Finnish Registry for Kidney Diseases; France: The Epidemiology and Information Network in Nephrology [REIN] (C. Couchoud); Hellenic Renal Registry (G. Moustakas); Hungarian Renal Registry (I. Kulcsar, L. Wagner, and L. Rosivall); Icelandic End-Stage Renal Disease Registry (R. Pálsson); 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] (M. Nordio, M. Postorino, and A. Limido); Kosovo Renal Registry (S. Selmani); Latvian Renal Registry

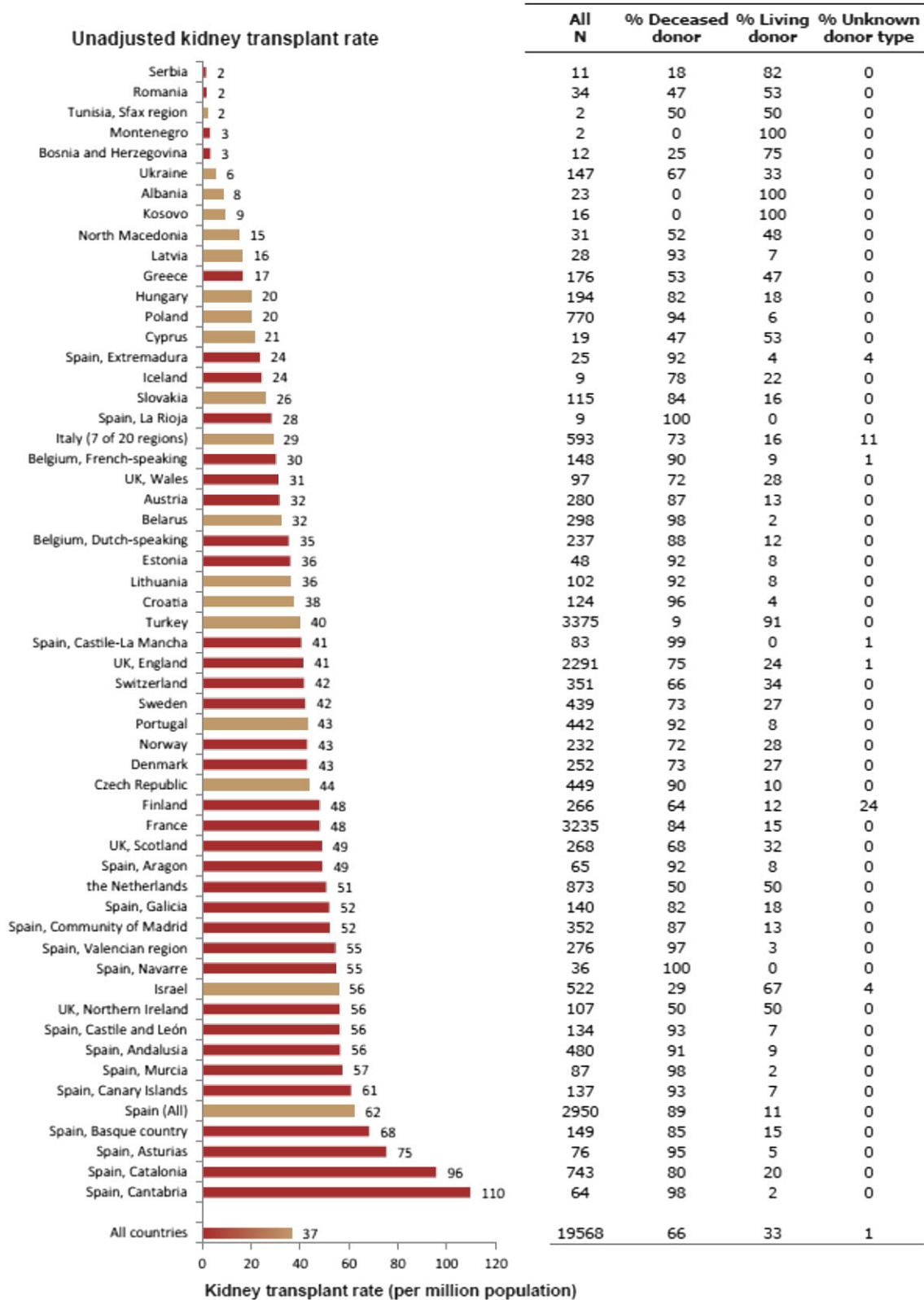
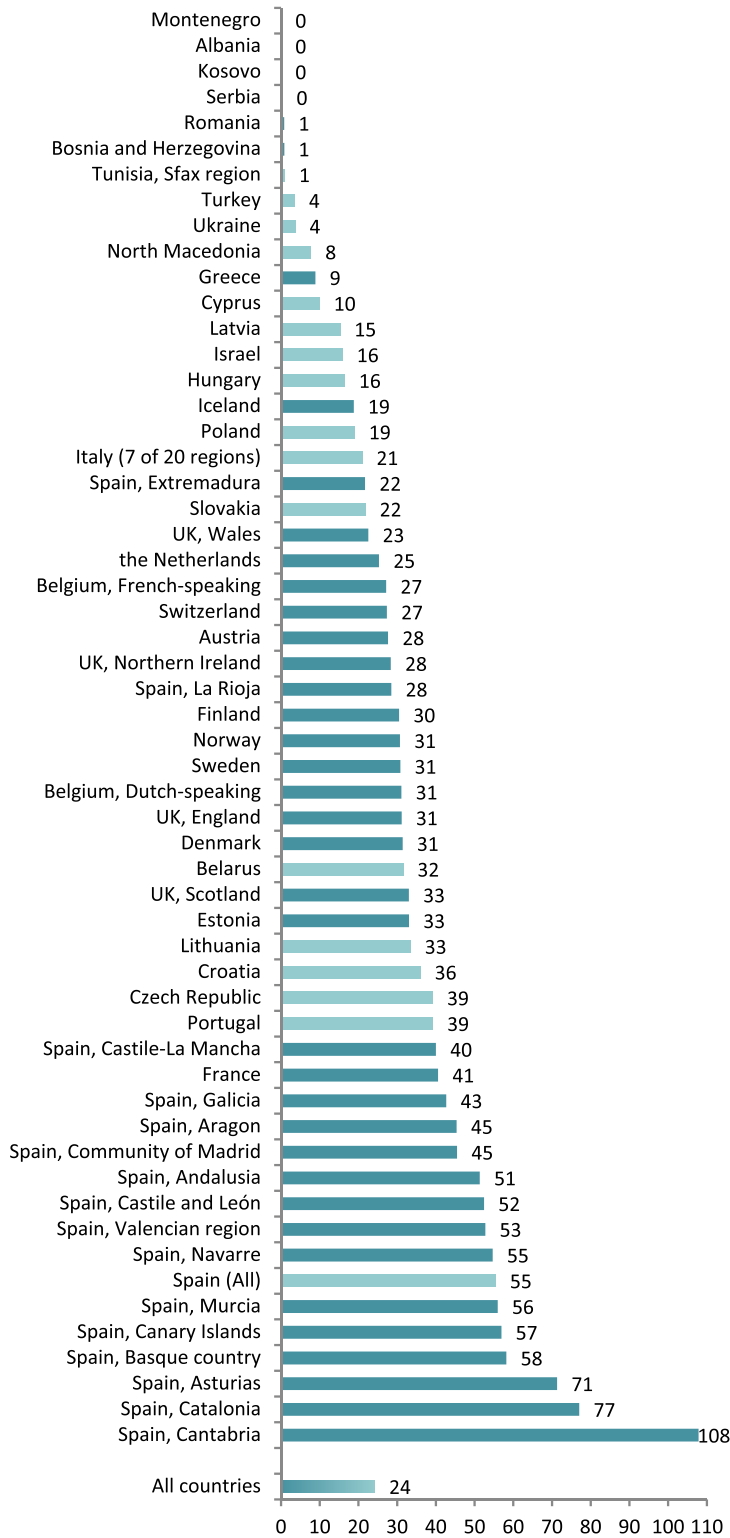


Figure 10: Kidney transplantations performed in 2021 counts and per million population by country or region, unadjusted. Registries providing individual patient data are shown as red bars and registries providing aggregated data as orange bars. See Appendix 1 for a list of countries and regions providing individual patient or aggregated data.



**Unadjusted kidney transplant rate – deceased donor**



**Unadjusted kidney transplant rate – living donor**

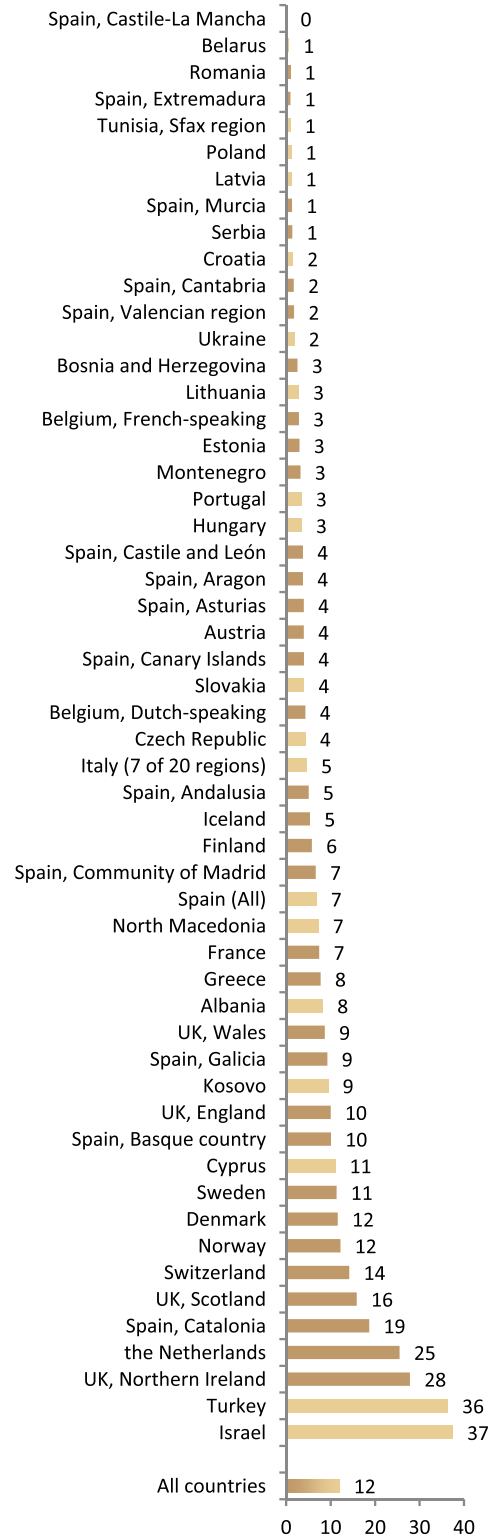


Figure 11: Kidney transplantations performed in 2021 per million population by donor type and by country or region, unadjusted. Registries providing individual patient data are shown as dark bars and registries providing aggregated data as light bars. See Appendix 1 for a list of countries and regions providing individual patient or aggregated data.

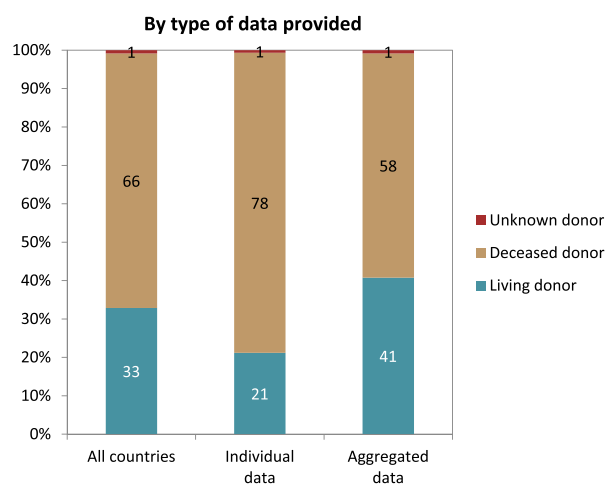


Figure 12: Donor type distribution for kidney transplantations performed in 2021 by type of data provided, unadjusted. See Appendix 1 for a list of countries and regions providing individual patient or aggregated data.

(V Kuzema, A Popova, and A Pētersons); Lithuanian Renal Registry (I. Nedzelskiene and V. Vainauskas); North Macedonian Renal Registry (I. Rambabova Bushjetikj); Norwegian Renal Registry (A.V. Reisæter); Renal Registry of Poland (P. Jagodzinski and R. Gellert); Portuguese Renal Registry (A Galvão and A. Ferreira); Romanian Renal Registry [RRR] (G. Mircescu, L. Garneata, and E. Podgoreanu); Renal Registry in Serbia (M Lausevic and all dialysis units in Serbia); Slovakian Renal Registry (I. Lajdová, V. Spustová, and A. Oksa); Spain Renal Registry (B. Mahillo Durán); Swedish Renal Registry [SRR] (K.G. Prütz, M. Evans, T. Lundgren, H. Rydell, and M. Segelmark); Swiss Dialysis Registry (P. Ambühl); Dutch Renal Registry [RENINE] (P. Verschoor and L. Heuveling); Tunisian (Sfax region) Renal Registry (D. Zalila); Registry of the Nephrology, Dialysis and Transplantation in Turkey [TSNNR] (K. Ateş and G. Süleymanlar); Ukrainian Renal Data System [URDS] (M. Kolesnyk); 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, Asturias (M.R. Cambor, J.R. Quirós, and RERCA working group), Basque country [UNIPAR] (Á. Magaz, J. Aranzabal, M. Rodrigo, and I. Moína), Canary Islands

Table 3: One-, two-, and five-year survival probabilities by treatment modality and cohort from day 1 of the start of KRT, dialysis, or from the day of kidney transplantation.

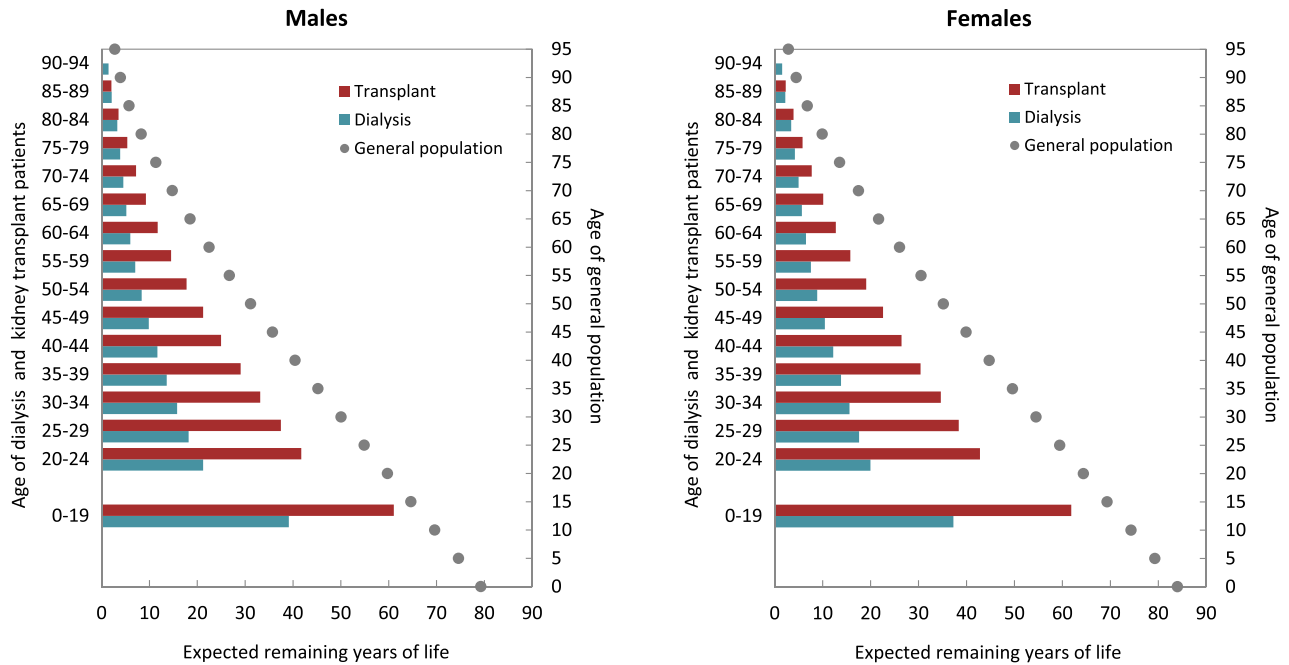
Survival type	Survival probabilities as % (95% confidence intervals)				
	Cohort: 2012–2016			Cohort: 2015–2019	
	1 year	2 year	5 year	1 year	2 year
Patient survival on KRT					
Unadjusted	85.1 (84.9–85.3)	75.1 (74.9–75.3)	51.7 (51.4–51.9)	85.7 (85.6–85.9)	75.7 (75.5–75.9)
Adjusted <sup>a</sup>	87.9 (87.7–88.0)	78.9 (78.7–79.1)	54.1 (53.8–54.3)	88.3 (88.2–88.5)	79.2 (79.0–79.4)
Patient survival on dialysis					
Unadjusted	84.0 (83.8–84.2)	72.4 (72.2–72.6)	41.4 (41.1–41.7)	84.7 (84.5–84.8)	73.0 (72.8–73.2)
Adjusted <sup>a</sup>	86.2 (86.1–86.4)	75.9 (75.7–76.1)	46.6 (46.3–46.9)	87.0 (86.9–87.2)	76.6 (76.5–77.0)
Patient survival after a first kidney transplantation (deceased donor)					
Unadjusted	96.2 (96.0–96.4)	94.1 (93.9–94.3)	85.8 (85.4–86.1)	96.4 (96.2–96.5)	93.9 (93.7–94.1)
Adjusted <sup>b</sup>	98.0 (97.9–98.2)	96.9 (96.8–97.1)	92.1 (91.8–92.4)	98.1 (98.0–98.2)	96.8 (96.7–97.0)
Graft survival after a first kidney transplantation (deceased donor)					
Unadjusted	91.1 (90.8–91.4)	87.9 (87.6–88.2)	77.0 (76.6–77.5)	91.4 (91.1–91.7)	88.0 (87.7–88.3)
Adjusted <sup>b</sup>	93.1 (92.8–93.3)	90.5 (90.2–90.8)	81.4 (81.0–81.9)	93.4 (93.2–93.6)	90.7 (90.4–91.0)
Patient survival after a first kidney transplantation (living donor)					
Unadjusted	98.9 (98.7–99.0)	98.0 (97.7–98.2)	94.2 (93.8–94.6)	98.9 (98.6–99.0)	97.9 (97.7–98.2)
Adjusted <sup>b</sup>	99.1 (98.9–99.2)	98.3 (98.1–98.6)	95.1 (94.7–95.5)	99.1 (98.9–99.3)	98.4 (98.1–98.6)
Graft survival after a first kidney transplantation (living donor)					
Unadjusted	96.7 (96.3–97.0)	95.1 (94.7–95.4)	88.3 (87.7–88.8)	96.8 (96.5–97.1)	95.2 (94.8–95.6)
Adjusted <sup>b</sup>	96.5 (96.2–96.9)	94.9 (94.5–95.3)	87.7 (87.1–88.3)	96.6 (96.3–97.0)	95.0 (94.6–95.4)

<sup>a</sup>Analyses were adjusted using fixed values: age (67 years), sex (63% male), and PRD (24% diabetes mellitus, 19% hypertension/renal vascular disease, 11% glomerulonephritis, and 46% other causes)

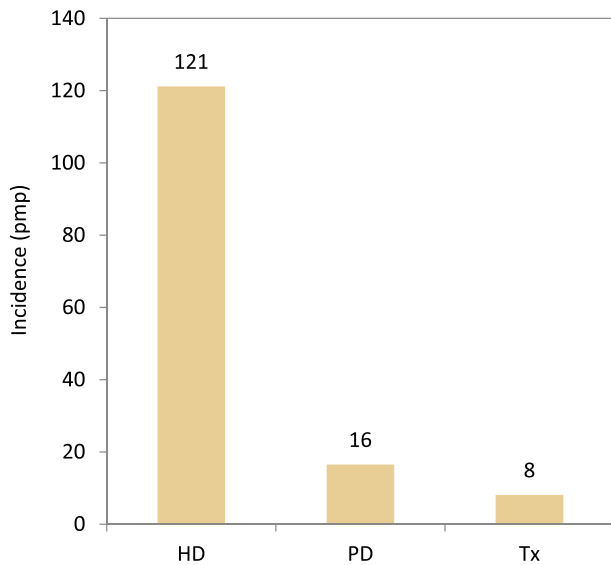
<sup>b</sup>Analyses were adjusted using fixed values: age (50 years), sex (63% men), and PRD (14% diabetes mellitus, 10% hypertension/renal vascular disease, 23% glomerulonephritis, and 53% other causes)

This table is based on data from the following registries providing individual patient data: Austria, Belgium (Dutch-speaking), Belgium (French-speaking), Bosnia and Herzegovina, Denmark, Estonia, 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 (Navarre), Spain (Valencian Region), Sweden, the Netherlands, United Kingdom (England/Northern Ireland/Wales) and United Kingdom (Scotland).

**Expected remaining years of life of the general population and of prevalent dialysis and kidney transplant patients**



**Figure 13:** Expected remaining years of life in the general population and for prevalent dialysis and kidney transplant patients (cohort 2017–2021), by sex. 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, Estonia, 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 (Navarre), Spain (Valencian Region), Sweden, the Netherlands, United Kingdom (England/Northern Ireland/Wales), and United Kingdom (Scotland).



**Figure 14:** Incidence per million population of KRT in 2021 on day 1 by treatment modality, unadjusted. HD: haemodialysis; PD: peritoneal dialysis; Tx: transplant.

(C. García Cantón and D. Marrero Miranda), Cantabria (J.C. Ruiz San Millán), Castile and León (P. Ucio Mingo, M. Prieto Velasco, and M.Á. Palencia García), Castile-La Mancha (G. Gutiérrez Ávila and I. Moreno Alía), Catalonia [RMRC] (J. Tort, J. Comas, and M. Vázquez), Community of Madrid (M.I. Aparicio de Madre and F. Tornero Molina), Extremadura (all the renal units (Nephrology and Dialysis)), Galicia (E. Bouzas-Caamaño), La Rioja (E. Huarte Loza, M. Artamendi Larrañaga, and H. Hernández Vargas), Murcia (I. Marín Sánchez), Navarre (J. Manrique Escola), and Valencian region (O. Zurriaga).

**ERA REGISTRY COMMITTEE MEMBERS**

C. Wanner, Germany (ERA President); A. Ortiz, Spain (Chairman); P. Ambühl, Switzerland; M. Arici, Turkey; M. Arnol, Slovenia; S. Bakkaloglu, Turkey; P.M. Ferraro, Italy; J. Helve, Finland; J.E. Sánchez-Alvarez, Spain; M. Segelmark, Sweden; S.S. Sørensen, Denmark; E. Vidal, Italy.

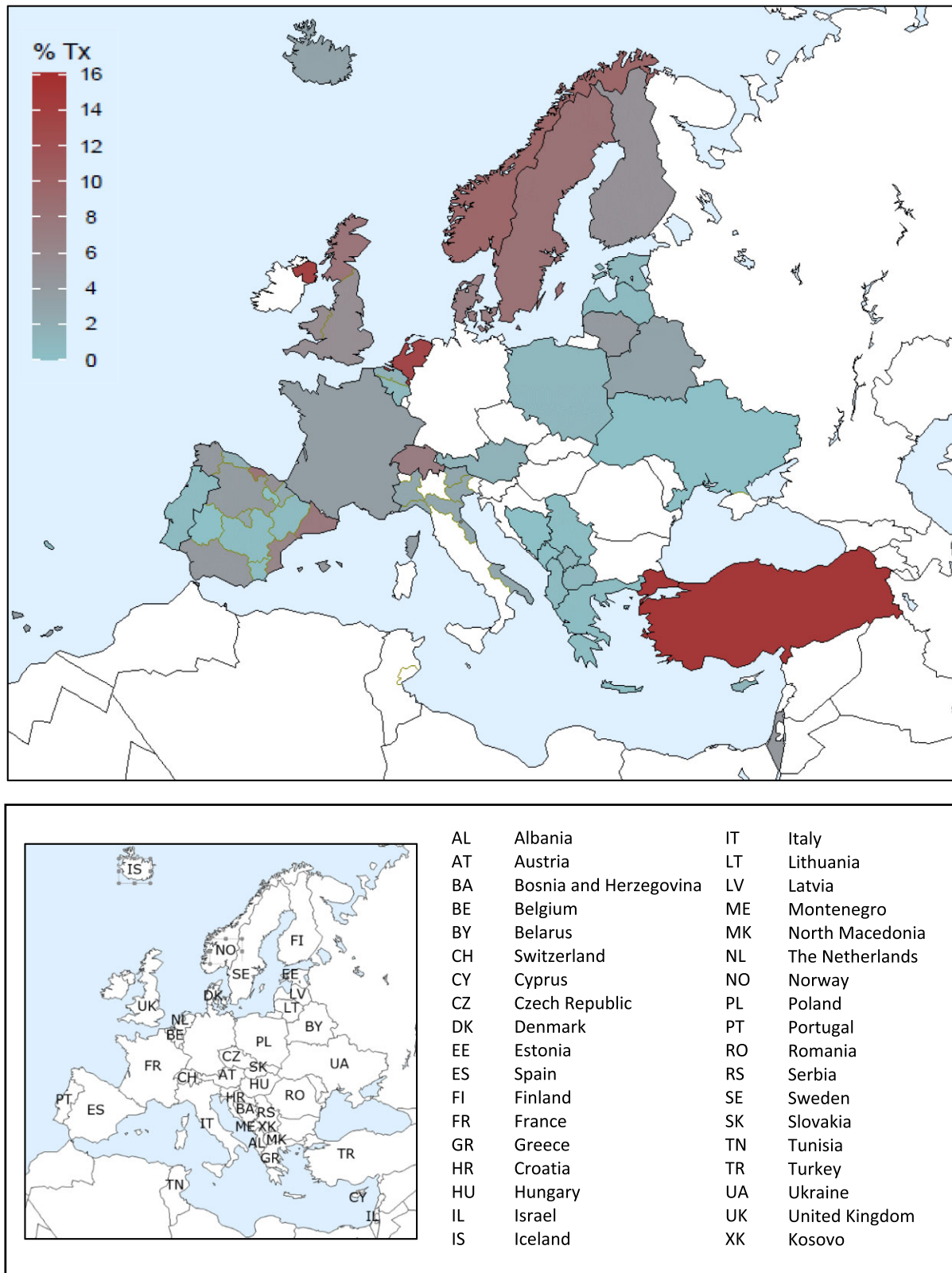


Figure 15: Percentage of pre-emptive kidney transplantations for incident patients accepted for KRT in 2021 on day 1 by country or region, unadjusted.

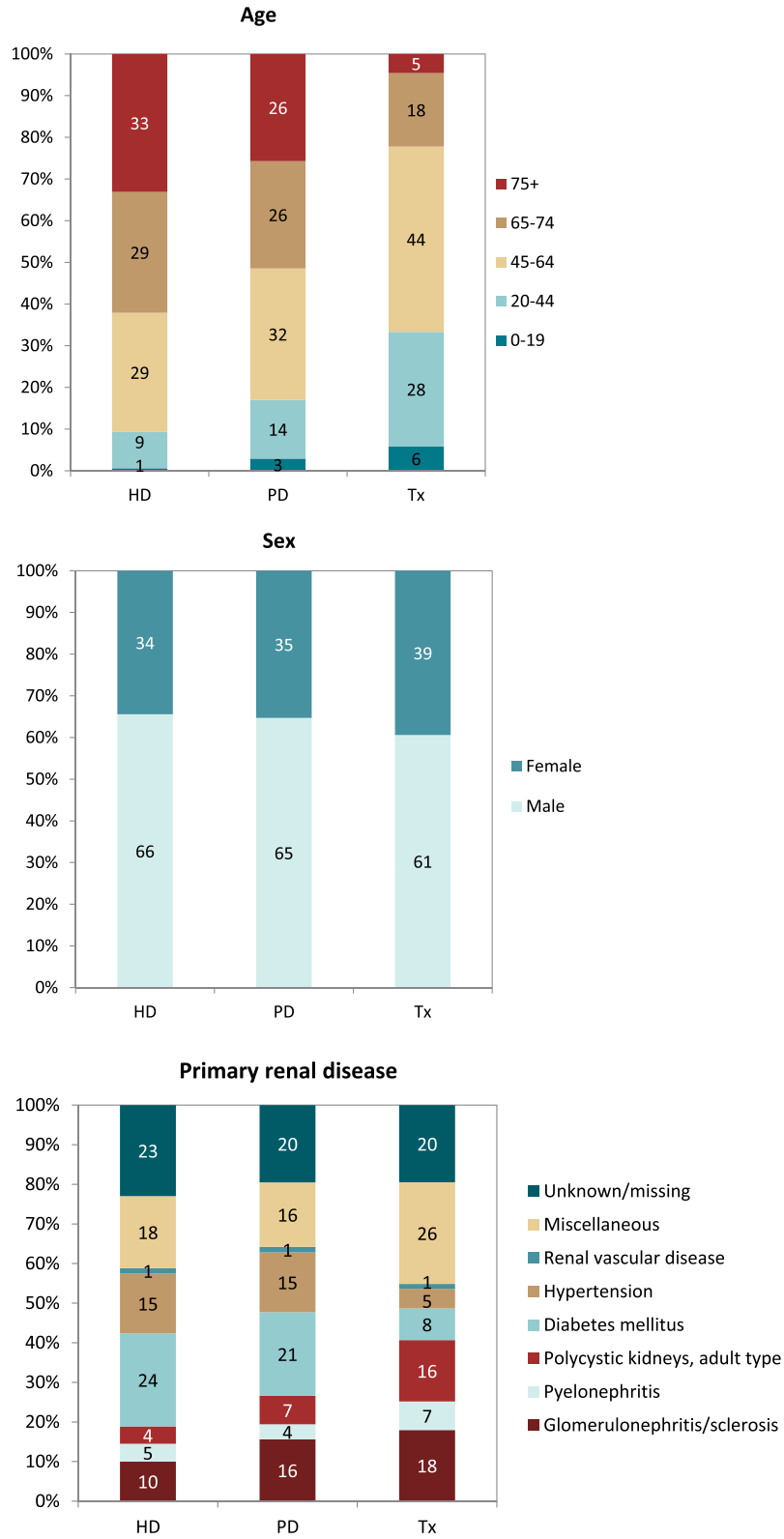
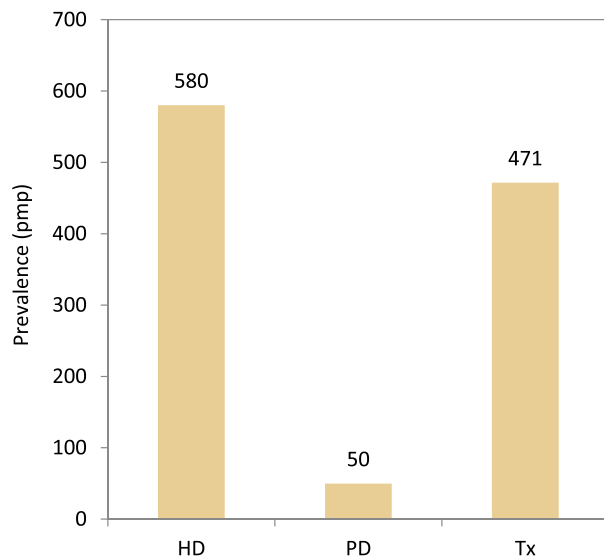


Figure 16: Distribution of (A) age, (B) sex, and (C) primary renal disease by treatment modality for incident patients accepted for KRT in 2021 on day 1, unadjusted. This figure is only based on data from registries providing individual patient data. HD: haemodialysis; PD: peritoneal dialysis; Tx: transplant.



**Figure 17:** Prevalence per million population of KRT on 31 December 2021 by treatment modality, unadjusted. HD: haemodialysis; PD: peritoneal dialysis; Tx: transplant.

### ERA REGISTRY OFFICE STAFF

V.S. Stel (Managing Director), M.E. Astley, B.A. Boerstra, M. Bonthuis, R. Boenink, I.H. van den Brand, N.C. Chesnaye, R. Cornet, K.J. Jager, A. Kramer, and A.J. Weerstra.

### SUPPLEMENTARY DATA

Supplementary data (ERA Registry Annual Report 2021) available at [ckj](#) online.

### ACKNOWLEDGEMENTS

The ERA Registry would like to thank the patients and staff of all the dialysis and transplant units who have contributed data via their national and regional renal registries. In addition, we

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### DATA AVAILABILITY STATEMENT

The data underlying this article have been published in the ERA Registry Annual Report 2021 (Supplementary information).

### CONFLICT OF INTEREST STATEMENT

None declared.

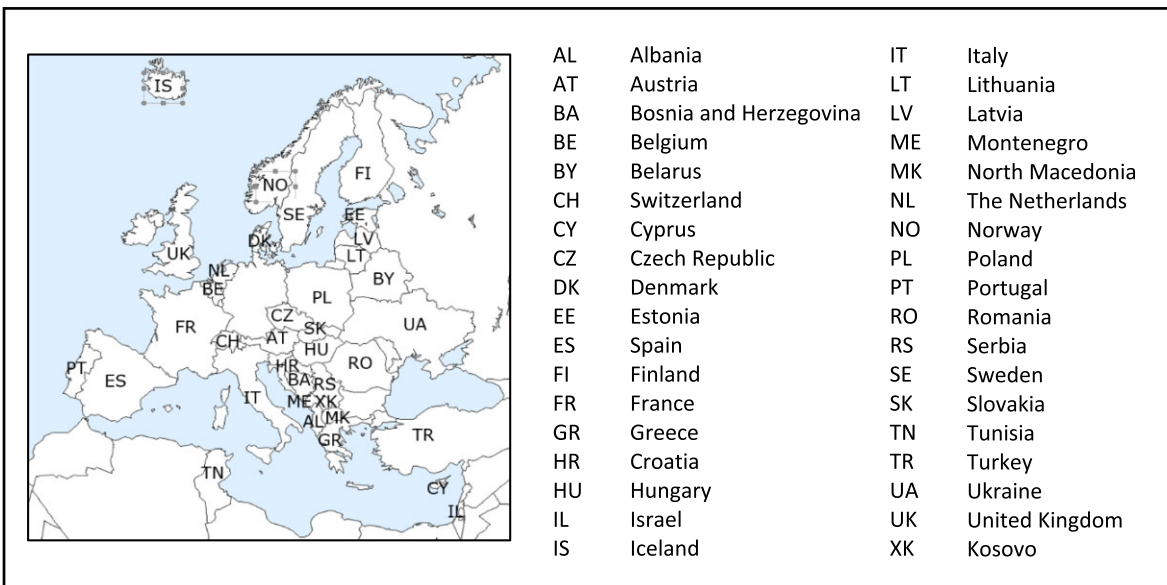
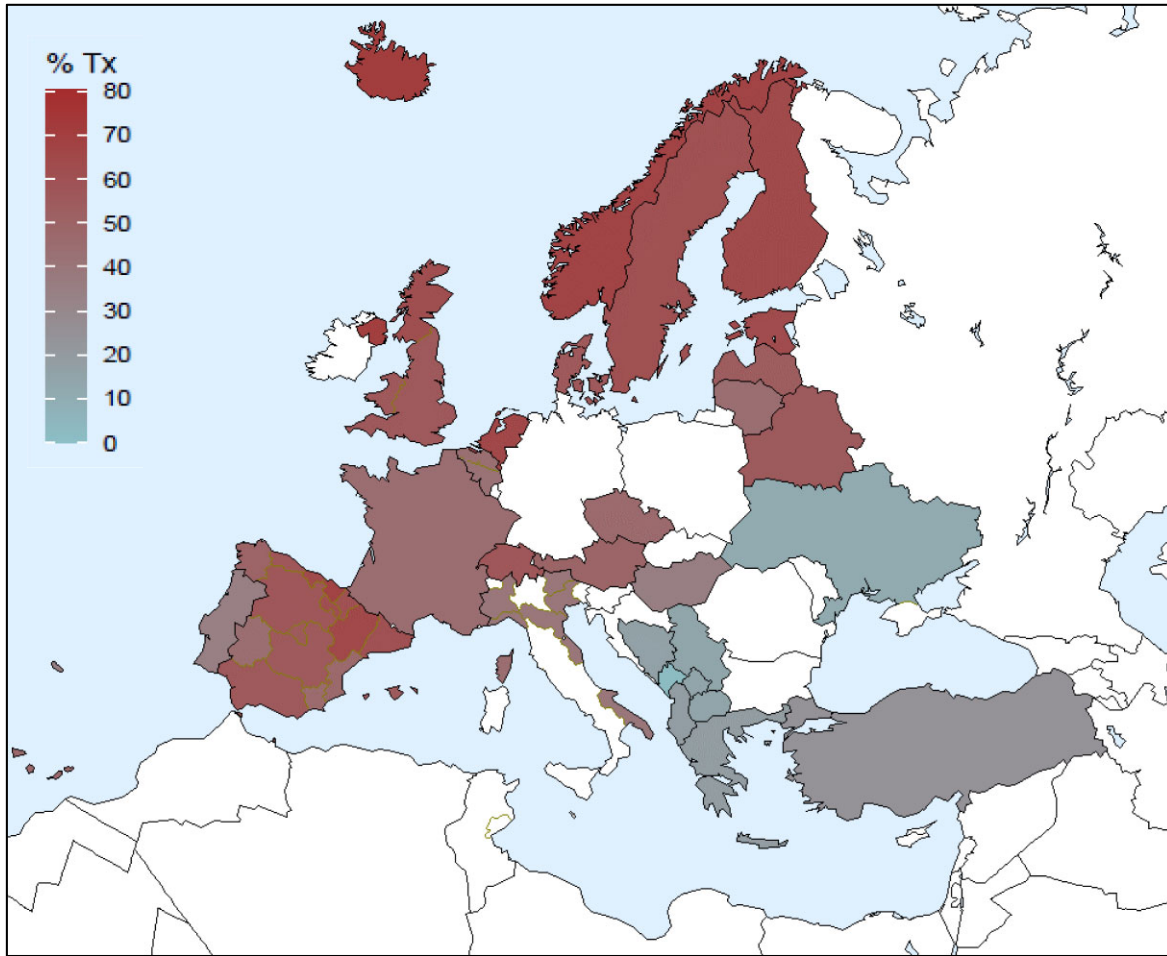


Figure 18: Percentage of kidney transplantations for prevalent patients on KRT on 31 December 2021, unadjusted.

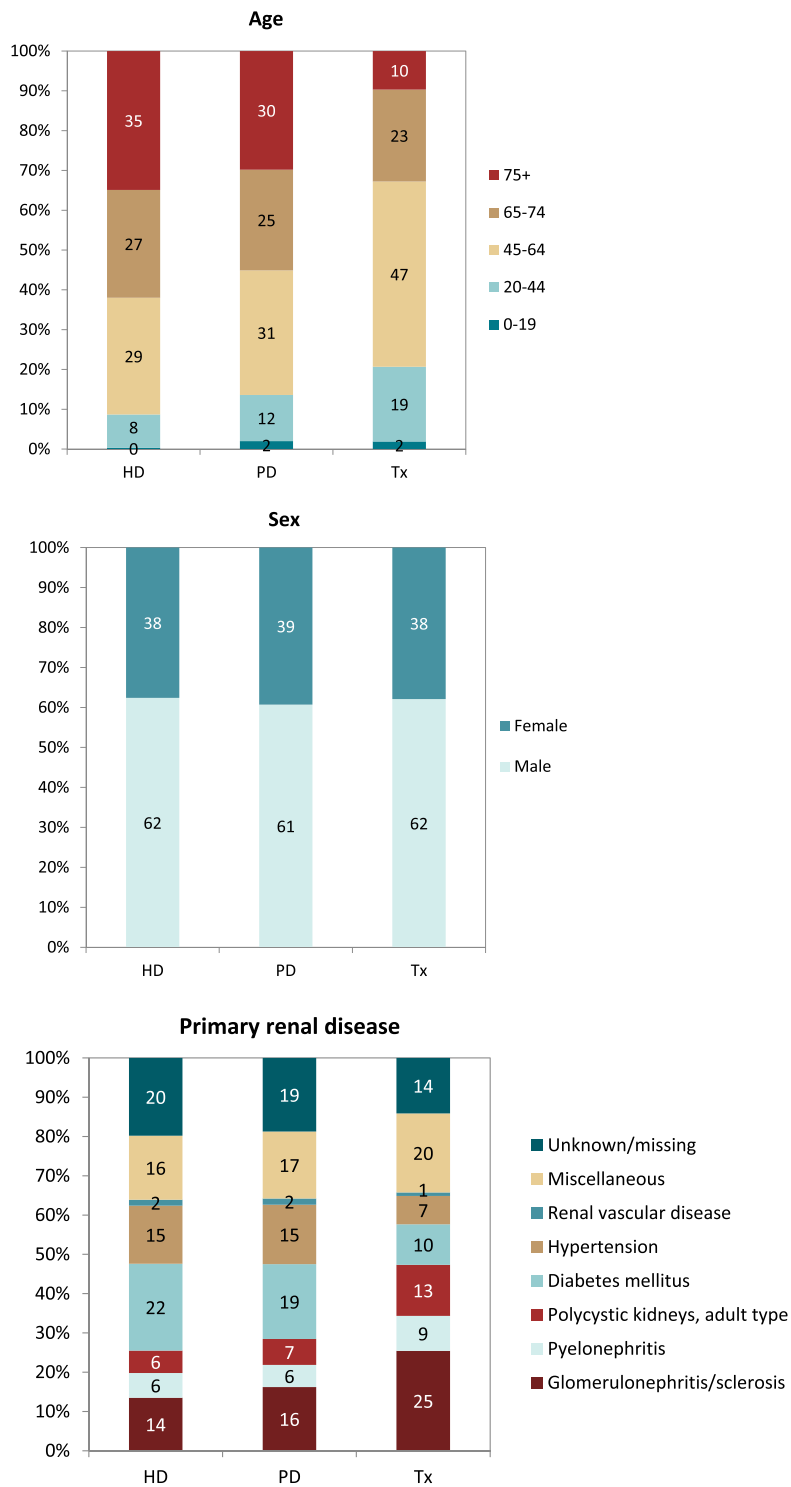


Figure 19: Distribution of (A) age, (B) sex, and (C) primary renal disease by treatment modality for prevalent patients on KRT on 31 December 2021, unadjusted. This figure is only based on data from registries providing individual patient data. HD: haemodialysis; PD: peritoneal dialysis; Tx: transplant.



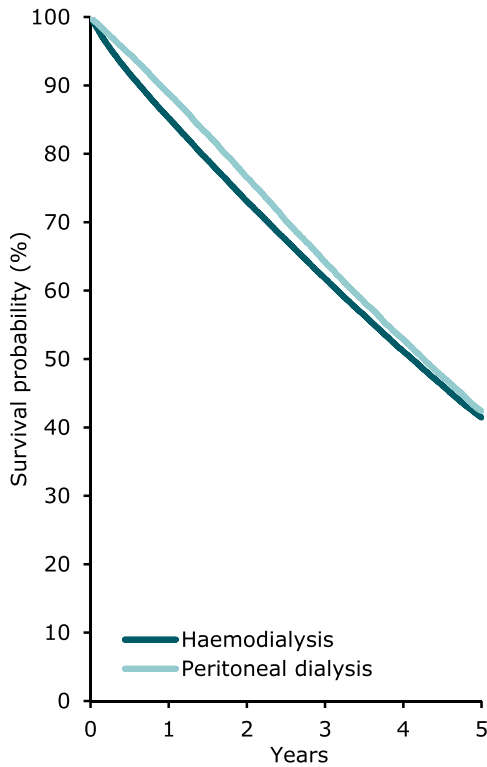


Figure 20: Patient survival by modality (HD or PD) for incident dialysis patients accepted for KRT in 2021 on day 91 (cohort 2012–2016), unadjusted. This figure is based on data from registries providing individual patient data.

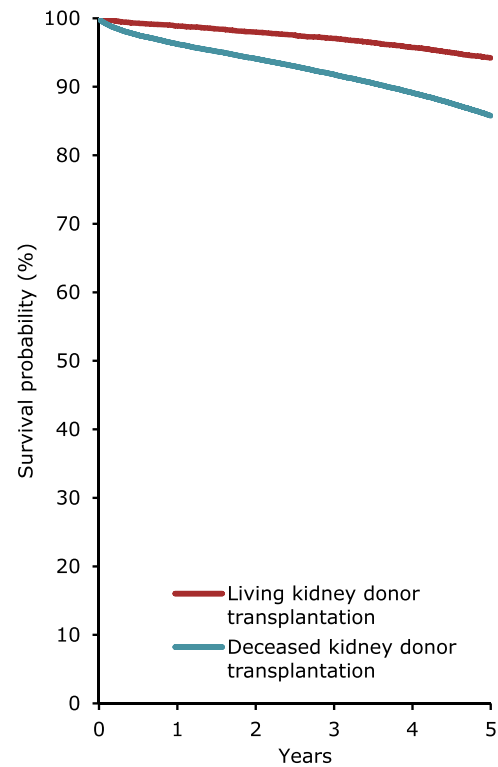


Figure 21: Patient survival in first-time transplant recipients by donor type (deceased or living) from day of transplantation (cohort 2012–2016), unadjusted. This figure is based on data from registries providing individual patient data.

## APPENDIX 1

### Countries or regions providing individual patient data to the ERA Registry

Austria, Belgium (Dutch-speaking), Belgium (French-speaking), Bosnia and Herzegovina, Denmark, Estonia, Finland, France, Greece, Iceland, Montenegro, Norway, Romania, Serbia, Spain (Andalusia), Spain (Aragon), Spain (Asturias), Spain (Basque country), Spain (Canary Islands), Spain (Cantabria), Spain (Castile and León), Spain (Castile-La Mancha), Spain (Catalonia), Spain (Community of Madrid), Spain (Extremadura), Spain (Galicia), Spain (La Rioja), Spain (Murcia), Spain (Navarre), Spain (Valencian region), Sweden, Switzerland, the Netherlands, United Kingdom (England/Northern Ireland/Wales), and United Kingdom (Scotland).

### Countries or regions providing aggregated data to the ERA Registry

Albania, Belarus, Croatia, Cyprus, Czech Republic, Hungary, Israel, Italy, Kosovo, Latvia, Lithuania, North Macedonia, Poland, Portugal, Slovakia, Spain, Tunisia (Sfax region), Turkey, and Ukraine.

### Countries part of the European Union (EU28) population as of 1 July 2013 (used as a reference population)

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

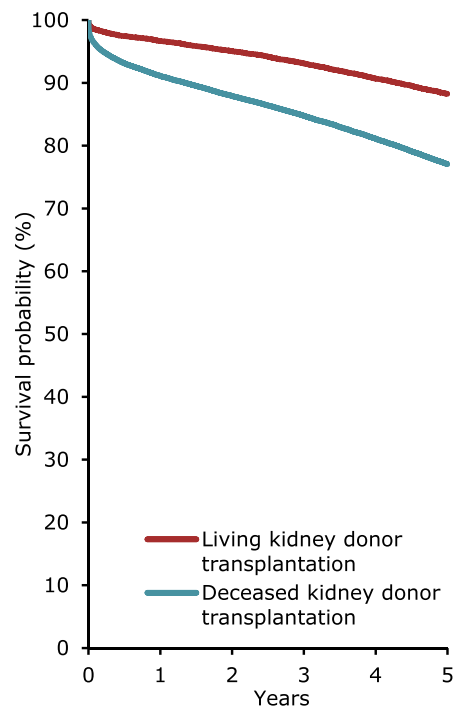


Figure 22: Graft survival in first-time kidney transplant recipients by donor type (deceased or living) from day of transplant (cohort 2012–2016), unadjusted. This figure is based on data from registries providing individual patient data.

## REFERENCES

1. Astley ME, Boenink R, Abd ElHafeez S et al. The ERA Registry Annual Report 2020: a summary. *Clin Kidney J* 2023;**16**:1330–54. <https://doi.org/10.1093/ckj/sfad087>
2. Eurostat: [www.ec.europa.eu/eurostat/data/database](http://www.ec.europa.eu/eurostat/data/database) (28 August 2023, date last accessed).
3. Boenink R, Astley ME, Huijben JA et al. The ERA Registry Annual Report 2019: summary and age comparisons. *Clin Kidney J* 2021;**15**:452–72. <https://doi.org/10.1093/ckj/sfab273>