



## ORIGINAL ARTICLE

# The European Renal Association – European Dialysis and Transplant Association Registry Annual Report 2014: a summary

Maria Pippias<sup>1</sup>, Anneke Kramer<sup>1</sup>, Marlies Noordzij<sup>1</sup>, Nikolaos Afentakis<sup>2</sup>, Ramón Alonso de la Torre<sup>3</sup>, Patrice M. Ambühl<sup>4</sup>, Manuel I. Aparicio Madre<sup>5</sup>, Felipe Arribas Monzón<sup>6</sup>, Anders Åsberg<sup>7</sup>, Marjolein Bonthuis<sup>8</sup>, Encarnación Bouzas Caamaño<sup>9</sup>, Ivan Bubic<sup>10</sup>, Fergus J. Caskey<sup>11</sup>, Pablo Castro de la Nuez<sup>12</sup>, Harijs Cerneviskis<sup>13</sup>, Maria de los Ángeles García Bazaga<sup>14</sup>, Jean-Marín des Grottes<sup>15</sup>, Raquel Fernández González<sup>16</sup>, Manuel Ferrer-Alamar<sup>17</sup>, Patrik Finne<sup>18,19</sup>, Liliana Garneata<sup>20</sup>, Eliezer Golan<sup>21</sup>, James G. Heaf<sup>22</sup>, Marc H. Hemmelder<sup>23</sup>, Alma Idrizi<sup>24</sup>, Kyriakos Ioannou<sup>25</sup>, Faical Jarraya<sup>26</sup>, Nino Kantaria<sup>27</sup>, Mykola Kolesnyk<sup>28</sup>, Reinhard Kramar<sup>29</sup>, Mathilde Lassalle<sup>30</sup>, Visnja V. Lezaic<sup>31</sup>, Frantisek Lopot<sup>32</sup>, Fernando Macario<sup>33</sup>, Ángela Magaz<sup>34</sup>, Angel L. Martín de Francisco<sup>35</sup>, Eduardo Martín Escobar<sup>36</sup>, Alberto Martínez Castela<sup>37</sup>, Wendy Metcalfe<sup>38</sup>, Inmaculada Moreno Alia<sup>39</sup>, Maurizio Nordio<sup>40</sup>, Mai Ots-Rosenberg<sup>41</sup>, Runolfur Pálsson<sup>42,43</sup>, Marina Ratkovic<sup>44</sup>, Halima Resic<sup>45</sup>, Boleslaw Rutkowski<sup>46</sup>, Carmen Santiuste de Pablos<sup>47</sup>, Nurhan Seyahi<sup>48</sup>, María Fernanda Slon Roblero<sup>49</sup>, Viera Spustova<sup>50</sup>, Koenraad J.F. Stas<sup>51</sup>, María E. Stendahl<sup>52</sup>, Olivera Stojceva-Taneva<sup>53</sup>, Evgueniy Vazlov<sup>54</sup>, Edita Ziginiski<sup>55,56,57</sup>, Ziad Massy<sup>58,59</sup>, Kitty J. Jager<sup>1</sup> and Vianda S. Stel<sup>1</sup>

<sup>1</sup>ERA-EDTA Registry, Department of Medical Informatics, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands, <sup>2</sup>Hellenic Renal Registry, Board of Registry, Coordination and Control of RRT, General Hospital of Athens 'G. Gennimatas', Athens, Greece, <sup>3</sup>Public Health Directorate, Asturias, Spain, <sup>4</sup>Swiss Dialysis Registry, Renal Division, Stadtspital Waid, Zurich, Switzerland, <sup>5</sup>Registro Madrileño de

Received: September 20, 2016. Accepted: November 7, 2016

© The Author 2017. Published by Oxford University Press on behalf of ERA-EDTA.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact [journals.permissions@oup.com](mailto:journals.permissions@oup.com)

Enfermos Renales (REMER), Oficina Regional de Coordinación de Trasplantes, Madrid, Spain, <sup>6</sup>Aragon Renal Registry, Coordinación de Trasplantes de Aragón, Zaragoza, Spain, <sup>7</sup>Norwegian Renal Registry, Department of Transplant Medicine, Oslo University Hospital – Rikshospitalet, Oslo, Norway, <sup>8</sup>ESPN/ERA-EDTA Registry, Department of Medical Informatics, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands, <sup>9</sup>Regional Transplant Coordination Office, Galicia, Spain, <sup>10</sup>Department of Internal Medicine, Clinical Hospital Centre Rijeka, School of Medicine University of Rijeka, Rijeka, Croatia, <sup>11</sup>UK Renal Registry, Learning and Research, Southmead Hospital, Bristol, UK, <sup>12</sup>Information System of Regional Transplant Coordination in Andalucía (SICATA), Andalucía, Spain, <sup>13</sup>Department of Internal Medicine, Riga Stradins University, Riga, Latvia, <sup>14</sup>Dirección General de Salud Pública, Servicio Extremeño de Salud, Consejería de Sanidad y Políticas Sociales, Junta de Extremadura, Cáceres, Spain, <sup>15</sup>CHU Tivoli, La Louvière, Belgium, <sup>16</sup>Registro de Enfermos Renales de Castilla y León, Coordinación de Trasplantes, Castilla y León, Spain, <sup>17</sup>Técnico Registro de Enfermos Renales Comunitat Valenciana, Servicio de Estudios Epidemiológicos y Registros Sanitarios, Subdirección General Epidemiología, Dirección General Salud Pública, Conselleria Sanitat, Valencian Region, Spain, <sup>18</sup>Department of Nephrology, Helsinki University Central Hospital, Helsinki, Finland, <sup>19</sup>Finnish Registry for Kidney Diseases, Helsinki, Finland, <sup>20</sup>Department of Internal Medicine and Nephrology 'Dr Carol Davila' Teaching Hospital of Nephrology, 'Carol Davila' University of Medicine and Pharmacy, Bucharest, Romania, <sup>21</sup>Department of Nephrology and Hypertension, Meir Medical Center, Kfar-Saba and Sackler Faculty of Medicine, Tel Aviv, Israel, <sup>22</sup>Department of Medicine, Zealand University Hospital, Roskilde, Denmark, <sup>23</sup>Dutch Renal Registry (Renine), Nefrovisie, Utrecht, The Netherlands, <sup>24</sup>Service of Nephrology, UHC 'Mother Teresa', Tirana, Albania, <sup>25</sup>Nephrology Department, Nicosia General Hospital, Nicosia, Cyprus, <sup>26</sup>Research Unit 12ES14, Faculty of Medicine, Sfax University and Hedi Chaker University Hospital, Sfax, Tunisia, <sup>27</sup>Department of Internal Medicine, Tbilisi State Medical University, Tbilisi, Georgia, <sup>28</sup>Main Coordinator of National Register of CKD and AKI Patients, State Institute of Nephrology, National Academy of Medical Sciences of Ukraine, Kiev, Ukraine, <sup>29</sup>Austrian Dialysis and Transplant Registry, Rohr, Austria, <sup>30</sup>REIN Registry, Agence de la Biomédecine, Paris, France, <sup>31</sup>Department of Nephrology, Clinical Centre of Serbia, Belgrade, Serbia, <sup>32</sup>Department of Medicine, General University Hospital and 1st Charles University Medical School, Strahov, Czech Republic, <sup>33</sup>Nephrology Department, Portuguese Society of Nephrology, University Hospital of Coimbra, Coimbra, Portugal, <sup>34</sup>Unidad de Información sobre Pacientes Renales de la Comunidad Autónoma del País Vasco (UNIPAR), Basque Country, Spain, <sup>35</sup>Servicio de Nefrología, Hospital Universitario Valdecilla, Santander, Cantabria, Spain, <sup>36</sup>Registro Español de Enfermos Renales (REER), Organización Nacional de Trasplantes, Madrid, Spain, <sup>37</sup>Member of the Catalan Renal Registry Committee, Hospital Universitari de Bellvitge, L'Hospitalet de Llobregat, Barcelona, Spain, <sup>38</sup>Scottish Renal Registry, Meridian Court, ISD Scotland, Glasgow, UK, <sup>39</sup>Registro de Enfermos Renales en Tratamiento Sustitutivo de Castilla-La Mancha, Servicio de Epidemiología, Dirección General de Salud Pública y Consumo Castilla-La Mancha, Toledo, Spain, <sup>40</sup>Nephrology and Dialysis Unit, AULSS 15, Veneto, Italy, <sup>41</sup>Department of Internal Medicine, Faculty of Medicine, Institute of Clinical Medicine, Tartu University, Tartu, Estonia, <sup>42</sup>Division of Nephrology, Landspítali – The National University Hospital of Iceland, Reykjavík, Iceland, <sup>43</sup>Faculty of Medicine, School of Health Sciences, University of Iceland, Reykjavik, Iceland, <sup>44</sup>Nephrology and Hemodialysis Department, Clinical Center of Montenegro, Ljubljanska, Montenegro, <sup>45</sup>Head of Clinic for Hemodialysis, Clinical Center University of Sarajevo, Sarajevo, Bosnia and Herzegovina, <sup>46</sup>Polish Renal Registry, Department of Nephrology, Transplantology and Internal Medicine, Medical University, Gdansk, Poland, <sup>47</sup>Registro de Enfermos Renales de la Región de Murcia, Servicio de Epidemiología, Consejería de Sanidad, IMIB-Arrixaca, Murcia, Spain, <sup>48</sup>Department of Internal Medicine, Cerrahpasa Medical Faculty, Division of Nephrology, Istanbul University, Istanbul, Turkey, <sup>49</sup>Consultant Nephrologist at Complejo Hospitalario de Navarra, Complejo Hospitalario de Navarra, Pamplona, Navarra, Spain, <sup>50</sup>Slovak Medical University, Bratislava, Slovakia, <sup>51</sup>Dienst Nefrologie, Jessa Ziekenhuis, Campus Virga Jesse, Hasselt, Belgium, <sup>52</sup>Swedish Renal Registry, Department of Medicine, Ryhov County Hospital, Jonkoping, Sweden, <sup>53</sup>University Clinic of Nephrology, Medical Faculty of Skopje, Skopje, Macedonia, <sup>54</sup>Dialysis Clinic, 'Alexandrovska' University Hospital, Sofia Medical University, Sofia, Bulgaria, <sup>55</sup>Lithuanian Nephrology, Dialysis and Transplantation Association, Kaunas, Lithuania, <sup>56</sup>Department of Nephrology, Medical Academy, Lithuanian University of Health Sciences, Kaunas, Lithuania,

<sup>57</sup>Nephrological Clinic, Hospital of Lithuanian University of Health Sciences Kaunas Clinics, Kaunas, Lithuania, <sup>58</sup>Division of Nephrology, Ambroise Paré University Hospital, APHP, Boulogne-Billancourt, France and <sup>59</sup>Institut National de la Santé et de la Recherche Médicale (INSERM) U1018, Team 5, CESP UVSQ, and University Paris Saclay, Villejuif, France

Correspondence and offprint requests to: Maria Pippias; E-mail: [m.pippias@amc.uva.nl](mailto:m.pippias@amc.uva.nl)

## Abstract

**Background:** This article summarizes the European Renal Association – European Dialysis and Transplant Association Registry's 2014 annual report. It describes the epidemiology of renal replacement therapy (RRT) for end-stage renal disease (ESRD) in 2014 within 35 countries.

**Methods:** In 2016, the ERA-EDTA Registry received data on patients who in 2014 were undergoing RRT for ESRD, from 51 national or regional renal registries. Thirty-two registries provided individual patient level data and 19 provided aggregated patient level data. The incidence, prevalence and survival probabilities of these patients were determined.

**Results:** In 2014, 70 953 individuals commenced RRT for ESRD, equating to an overall unadjusted incidence rate of 133 per million population (pmp). The incidence ranged by 10-fold; from 23 pmp in the Ukraine to 237 pmp in Portugal. Of the patients commencing RRT, almost two-thirds were men, over half were aged  $\geq 65$  years and a quarter had diabetes mellitus as their primary renal diagnosis. By day 91 of commencing RRT, 81% of patients were receiving haemodialysis. On 31 December 2014, 490 743 individuals were receiving RRT for ESRD, equating to an unadjusted prevalence of 924 pmp. This ranged throughout Europe by more than 10-fold, from 157 pmp in the Ukraine to 1794 pmp in Portugal. In 2014, 19 406 kidney transplantations were performed, equating to an overall unadjusted transplant rate of 36 pmp. Again this varied considerably throughout Europe. For patients commencing RRT during 2005–09, the 5-year-adjusted patient survival probabilities on all RRT modalities was 63.3% (95% confidence interval 63.0–63.6). The expected remaining lifetime of a 20- to 24-year-old patient with ESRD receiving dialysis or living with a kidney transplant was 21.9 and 44.0 years, respectively. This was substantially lower than the 61.8 years of expected remaining lifetime of a 20-year-old patient without ESRD.

**Key words:** dialysis, epidemiology, ESRD, kidney transplantation, survival analysis

## Introduction

The European Renal Association – European Dialysis and Transplant Association (ERA-EDTA) Registry's annual report describes the epidemiology of renal replacement therapy (RRT) for end-stage renal disease (ESRD) within Europe and adjacent countries based on data collected via the national and regional renal registries [1]. On an annual basis, we publish a summary of the ERA-EDTA Registry's annual report that is intended to provide the reader with an overview of the current status of RRT for ESRD in Europe [2–4]. In 2016, we received the 2014 data from 51 national or regional renal registries in 35 countries covering a general population of 531.7 million people. This represented 65.4% of the 2014 European general population. Thirty-two national or regional renal registries from 17 countries provided individual patient data, whereas 19 countries or regions provided aggregated data (see Appendix 1). The proportion of the European population covered by the ERA-EDTA Registry in 2014 was lower than that of 2013 (73.6%) due to the absence of Russia and Slovenia from this year's annual report.

This summary presents the 2014 incidence and prevalence of patients receiving RRT, kidney transplantation activity and the patient and graft survival in these 35 countries. The methods used to derive the results presented in this overview, along with the full results, can be found in the ERA-EDTA Registry 2014 Annual Report [1].

## Incidence of RRT

In 2014, 70 953 individuals commenced RRT for ESRD, which equated to an overall unadjusted incidence rate of 133 per

million population (pmp, Table 1). The unadjusted incidence rate was highest in Portugal (237 pmp), Greece (218 pmp) and Cyprus (204 pmp), whereas it was lowest in the Ukraine (23 pmp) and Iceland (58 pmp, Table 1 and Figures 1 and 2). Of the patients commencing RRT, the majority were men (63%), over half were aged  $\geq 65$  years (55%) and a quarter had diabetes mellitus (26%) as their primary renal diagnosis (Figure 3). The mean age of the patients commencing RRT in all countries and regions combined was 64.6 years (Table 1). However, this ranged from a mean age of 55.1 years in Albania to 70.1 years in Dutch-speaking Belgium. Of the incident patients alive and receiving RRT at day 91 after the start of treatment, the majority were receiving haemodialysis (81%), 13% were receiving peritoneal dialysis and 6% were living with a kidney transplant (Figure 4). However, the modality of RRT at day 91 after the start of treatment varied considerably between age groups; as the age of the patient increased the proportion of patients receiving either peritoneal dialysis or living with a kidney transplant decreased. Furthermore, patients with a primary renal diagnosis of diabetes mellitus were half as likely to have a kidney transplant by day 91 compared with the non-diabetic group (3% versus 7%).

## Prevalence of RRT

On 31 December 2014, 490 743 individuals were receiving RRT for ESRD (Table 2). This equated to an unadjusted prevalence of 924 pmp. Again there was considerable variation between countries, with the highest unadjusted prevalence rates seen in Portugal (1794 pmp), the Spanish regions of Catalonia (1312 pmp), Valencia (1298 pmp), Galicia (1265 pmp) and Murcia (1258

**Table 1.** Incidence of RRT in 2014 at day 1, for all primary renal diseases combined and diabetes mellitus types 1 and 2, by count (N) and un-adjusted rate per million population, and for all primary renal diseases combined, the mean age at the start of RRT, presented by country/region

	General population covered by the registry in thousands	Incidence in 2014 at day 1				
		Total N	Total pmp	Mean age	DM N	DM pmp
Albania	2863	252	88	55.1	30	11
Austria	8508	1036	122	64.2	259	30
Belgium, Dutch-speaking <sup>a</sup>	6444	1145	178	70.1	207	32
Belgium, French-speaking <sup>a</sup>	4788	828	173	67.5	188	39
Bosnia and Herzegovina	3508	421	120	60.7	125	36
Bulgaria <sup>b</sup>	7217	1197	166		281	39
Croatia	4070	640	157	63.7	186	46
Cyprus	847	173	204	64.6	58	69
Czech Republic <sup>b</sup>	10 222	2017	197			
Denmark	5700	748	131	64.2	184	32
Estonia	1315	115	88	61.1	20	15
Finland	5462	461	84	59.3	165	30
France	66 262	10 791	163	67.6	2379	36
Georgia	4491	743	166	58.4	159	35
Greece	10 892	2372	218	69.7	575	53
Iceland	327	19	58	62.0	1	3
Israel	8216	1668	203	64.6	807	98
Italy (6 of 20 regions)	21 274	3243	152	68.6	558	26
Latvia	1590	152	96	63.3	23	15
Lithuania	2943	306	104	57.8	48	16
Macedonia	2022	268	133	63.2	62	31
Montenegro <sup>a</sup>	622	58	93	56.2	20	32
Norway	5137	523	102	62.4	90	18
Poland	36 338	4341	120			
Portugal	10 427	2473	237		790	76
Romania	19 710	2997	152	61.1	442	22
Serbia	7131	985	138	61.2	250	35
Slovakia	5421	831	153	63.8	316	58
Spain	46 771	6229	133	63.0	1520	33
Spain, Andalusia	8394	1046	125	62.6	270	32
Spain, Aragon	1329	163	123	64.1	40	30
Spain, Asturias	1059	147	139	64.5	33	31
Spain, Basque country	2166	241	111	65.5	39	18
Spain, Cantabria <sup>a</sup>	587	61	104	61.4	12	21
Spain, Castile and León <sup>a</sup>	2487	299	120	67.6	79	32
Spain, Castile-La Mancha <sup>a</sup>	2069	252	122	63.7	62	30
Spain, Catalonia	7519	1178	157	66.0	259	34
Spain, Extremadura	1100	124	113	66.0	28	26
Spain, Galicia	2741	398	145	65.0	114	42
Spain, Community of Madrid	6454	828	128	64.3	201	31
Spain, Region of Murcia	1467	194	132	62.9	46	31
Spain, Navarre <sup>a</sup>	636	83	130	65.0	14	22
Spain, Valencian region	5005	704	141	65.9	156	31
Sweden	9696	1168	121	62.5	273	28
Switzerland <sup>c</sup>	8230	800	97	64.5	157	19
The Netherlands	16 865	1941	115	63.6	358	21
Tunisia, Sfax region	1186	165	139	60.1	59	50
Turkey <sup>d</sup>	77 696	11 447	147		1042	13
Ukraine	42 903	998	23		196	5
UK, England <sup>a</sup>	54 317	6311	116	62.3	1441	27
UK, Northern Ireland <sup>a</sup>	1840	170	92	64.6	39	21
UK, Scotland	5348	557	104	58.8	164	31
UK, Wales <sup>a</sup>	3092	364	118	65.5	94	30
All countries	531 690	70 953	133	64.6	13 566	32

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

DM, diabetes mellitus as cause of renal failure.

<sup>a</sup>Patients younger than 20 years of age are not reported. The true incidence counts are, therefore, slightly higher than the counts reported here.

<sup>b</sup>Data on incidence include dialysis patients only.

<sup>c</sup>Data on incidence of cause of renal failure (DM) include dialysis patients only.

<sup>d</sup>Data on incidence of cause of renal failure (DM) are based on 2836 of 11 447 patients (24.8%).



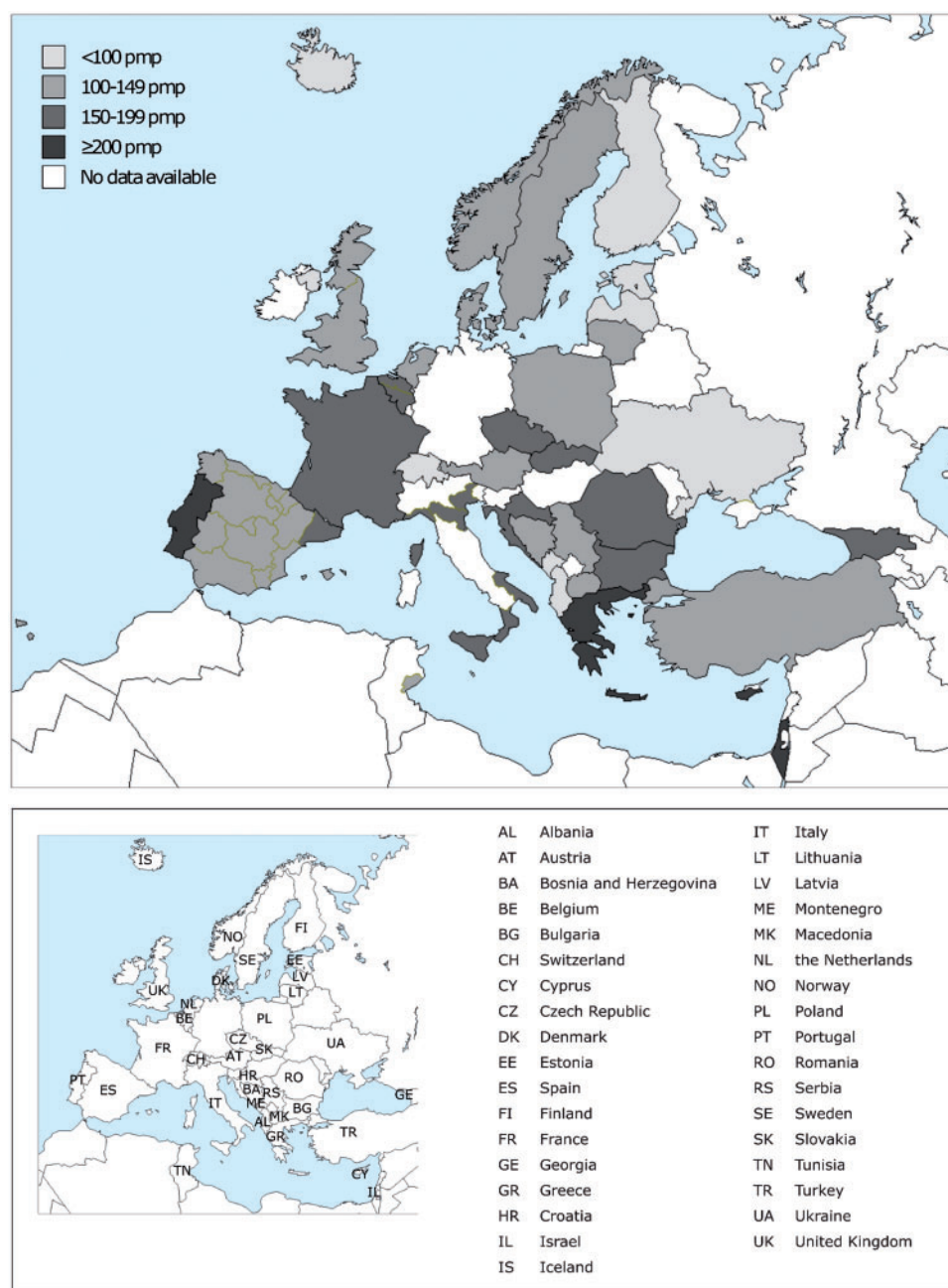


Fig. 1. Unadjusted incident rates per million population by country/region at day 1 in 2014. The incident rates for Bulgaria and the Czech Republic only include patients receiving dialysis.

pmp), and French- and Dutch-speaking Belgium (1250 pmp and 1238 pmp, respectively, Table 2 and Figures 5 and 6). The unadjusted prevalence of RRT was considerably lower in the Ukraine (157 pmp) and Albania (374 pmp). Of the prevalent patients, the majority were men (60%); however, now just under half were aged  $\geq 65$  years (44%) and a fifth had diabetes mellitus (19%) as their primary renal diagnosis (Figure 7). The mean age of the prevalent patients receiving RRT in all countries and regions combined was 60.9 years (Table 2). This ranged from a mean age of 51.4 years in Albania to 66.4 years in Portugal. The majority of prevalent patients were receiving haemodialysis (57%), just over a third of patients were living with a kidney transplant (37%) and only 5% were receiving peritoneal dialysis (Figure 8). Once again the modality of RRT varied considerably

between age groups; as the age of the prevalent patients increased the proportion living with a kidney transplant decreased. For those aged 20–44 years, 65% were living with a kidney transplant, whereas this was only 40% of patients aged 65–74 years. Again prevalent patients with a primary renal diagnosis of diabetes mellitus were much less likely to be living with a kidney transplant compared with the non-diabetic group (28% versus 49%).

### Kidney transplantation

In 2014, 19 406 kidney transplantations were performed that equated to an overall unadjusted transplant rate of 36 pmp (Figure 9). Again this figure varied considerably between

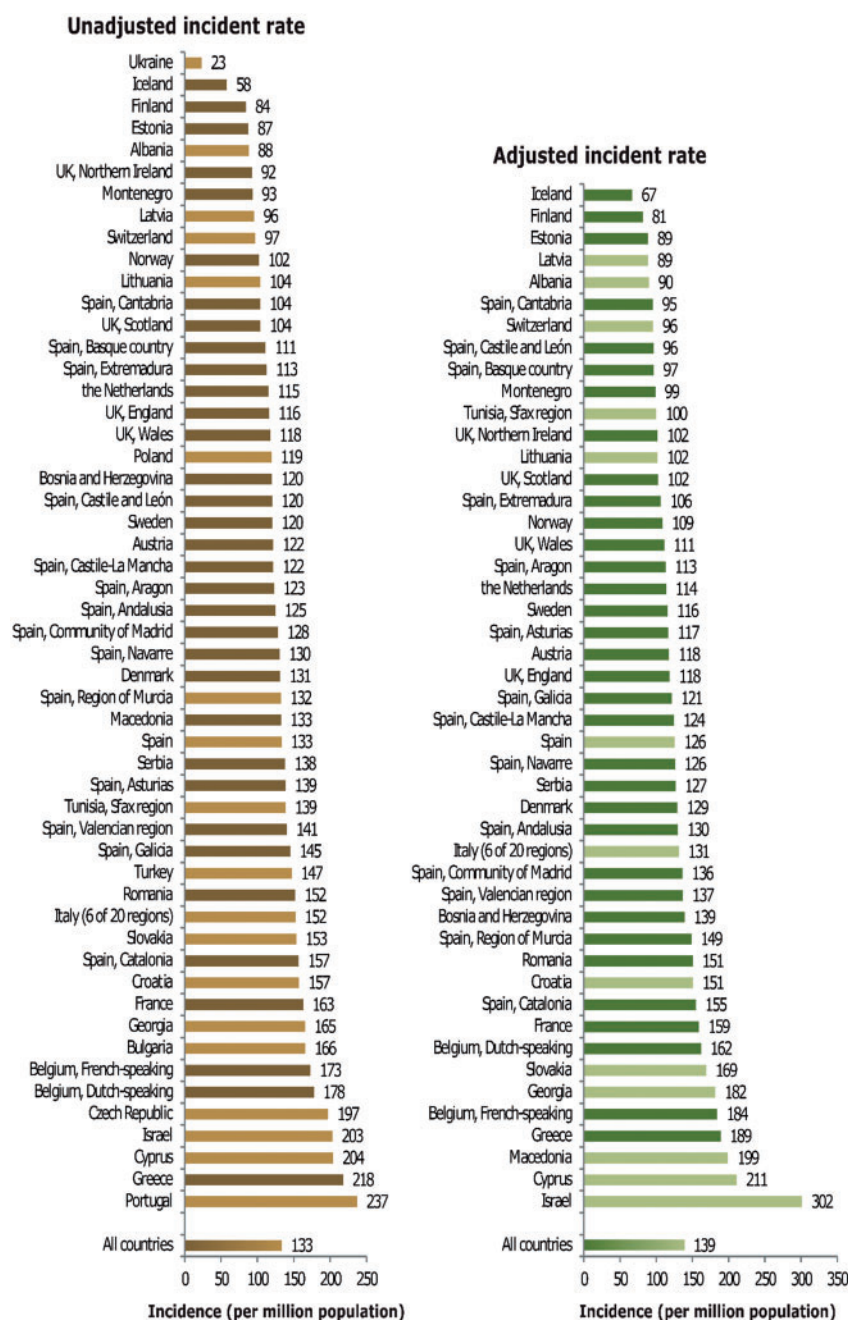


Fig. 2. Unadjusted (left panel) and adjusted (right panel) incident rates per million population by country/region at day 1 in 2014. Registries providing individual patient data are shown as dark bars and registries providing aggregated data as light bars. The incident rate for Bulgaria and the Czech Republic only includes patients receiving dialysis.

countries with the highest unadjusted transplant rates seen in the Netherlands (59 pmp), Spain (57 pmp) and Norway (53 pmp), with some Spanish regions reaching even higher rates. Conversely, the lowest unadjusted transplant rates were reported in the Ukraine (2 pmp), Georgia (6 pmp) and Bulgaria (7 pmp). Overall the unadjusted deceased donor transplant rate was more than double that of the unadjusted living donor transplant rate (27 pmp versus 12 pmp, Figure 10; 68% versus 31%, Figure 11). The highest unadjusted rates of deceased donor transplants were seen in Spain (48 pmp), Croatia (46 pmp) and

the Czech Republic (43 pmp, Figure 10), whereas the highest unadjusted rate of living donor transplants were seen in the Netherlands (31 pmp), Turkey (30 pmp) and Northern Ireland (28 pmp, Figure 10).

### Survival of patients receiving RRT

For patients commencing RRT in the period 2005–09, the 1-, 2- and 5-year-adjusted patient survival probabilities on all RRT modalities were 90.0% [95% confidence interval (CI) 89.9–90.2],

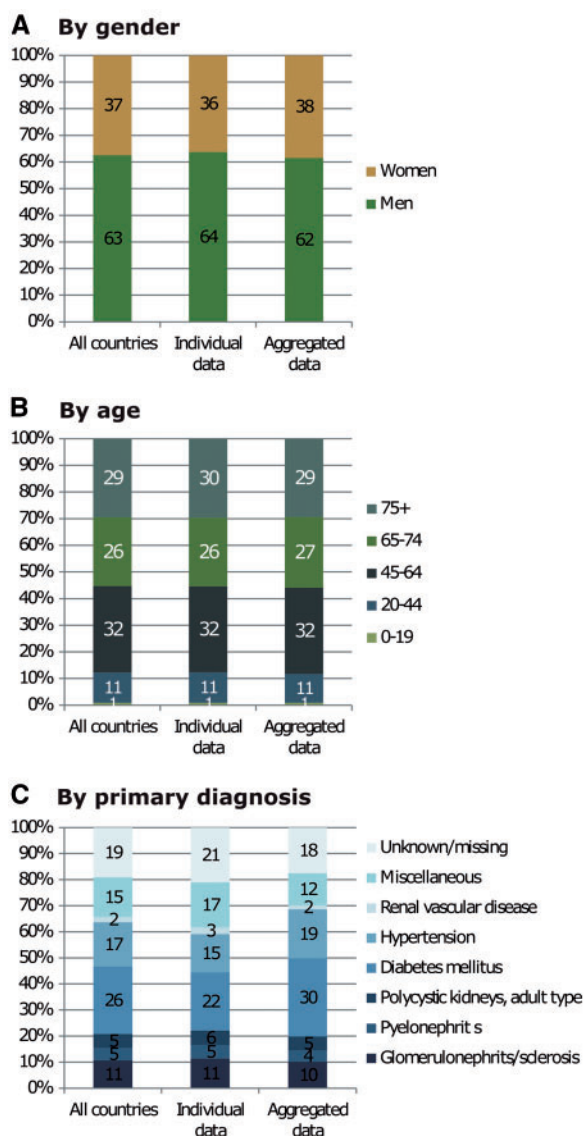
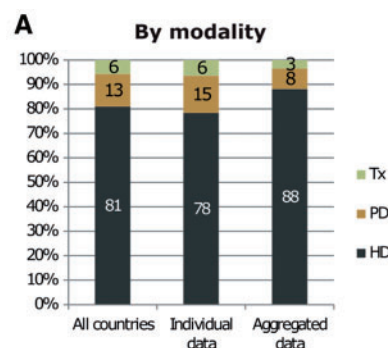


Fig. 3. Unadjusted incident percentages by (A) gender, (B) age and (C) primary renal diagnosis at day 1 in 2014. See Appendix 1 for a list of countries and regions supplying individual patient level or aggregated level data.

82.8% (95% CI 82.6–83.0) and 63.3% (95% CI 63.0–63.6), respectively (see Appendix 2 and Table 3 for a description of the adjustments made and the countries/regions included in this analysis). For the same cohort of patients commencing dialysis between 2005 and 2009, the 1-, 2- and 5-year-adjusted patient survival probabilities (with kidney transplantation considered as a censored event) were 88.1% (95% CI 87.9–88.2), 79.5% (95% CI 79.2–79.7) and 55.7% (95% CI 55.3–56.1), respectively. Patient survival after a first kidney transplant performed during 2005 and 2009 was much better than for those patients receiving dialysis (Figure 12). For those with a transplant, 5-year-adjusted patient and graft survival remain higher with a living donor transplant compared with a deceased donor transplant [95.7% (95% CI 95.2–96.2) versus 92.3% (95% CI 91.9–92.7) for patient survival and 87.0% (95% CI 86.3–87.8) versus 81.6% (95% CI 81.1–82.2) for graft survival. See Appendix 2 and Table 3 for a description of the adjustments made and the countries/regions included in this analysis.].



The figures below are only based on data from registries providing individual patient data

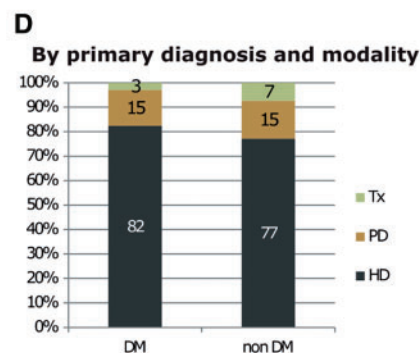
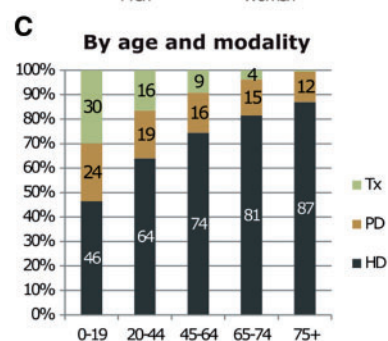
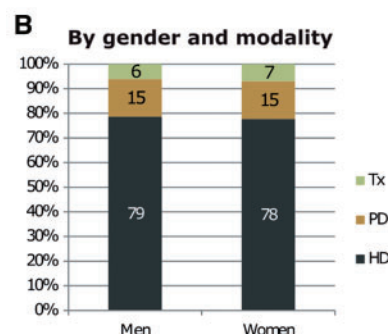


Fig. 4. Unadjusted incident percentages of (A) established therapy overall, and established therapy by (B) gender, (C) age and (D) primary renal diagnosis at day 91 in 2014. (B)–(D) are only based on data from registries providing individual patient data. See Appendix 1 for a list of countries and regions supplying individual patient level or aggregated level data. HD, haemodialysis; PD, peritoneal dialysis; Tx, transplant; DM, diabetes mellitus.

## Expected remaining lifetime

There remains a substantial difference in the expected remaining lifetime between the general population and those receiving dialysis (Figure 13). Patients aged 20–45 years old

**Table 2.** Prevalence of RRT on 31 December 2014, for all primary renal diseases combined and diabetes mellitus types 1 and 2, by count (N) and unadjusted rate per million population, and for all primary renal diseases combined, the mean age of prevalent patients, presented by country/region

	General population covered by the registry in thousands	Prevalent patients on RRT in 2014				
		Total N	Total pmp	Mean age	DM N	DM pmp
Albania	2863	1072	374	51.4	120	42
Austria	8508	9038	1062	60.8	1791	211
Belgium, Dutch-speaking <sup>a</sup>	6444	7980	1238	65.5	1379	214
Belgium, French-speaking <sup>a</sup>	4788	5983	1250	64.6	1035	216
Bosnia and Herzegovina	3508	2662	759	59.4	501	143
Bulgaria	7217	4168	578			
Croatia	4070	4295	1055	64.6	1246	306
Cyprus	847					
Czech Republic	10 222	10 931	1069			
Denmark	5700	5164	906	58.4	869	153
Estonia	1315	834	634	57.8	155	118
Finland	5462	4571	837	58.8	1167	214
France	66 262	80 144	1210	62.2	12 604	190
Georgia	4491	2096	467	56.1	435	97
Greece	10 892	13 101	1203	63.8	2399	220
Iceland	327	221	675	56.0	24	73
Israel <sup>b</sup>	8216	6286	765	60.9	2909	354
Italy (6 of 20 regions)	21 274	24 721	1162	61.8	2941	138
Latvia	1590	996	627	55.7	97	61
Lithuania	2943	2146	729			
Macedonia	2022	1543	763	56.9	225	111
Montenegro <sup>a</sup>	622	296	476	52.4	47	76
Norway	5137	4716	918	59.1	628	122
Poland	36 338	31 106	856			
Portugal <sup>c</sup>	10 427	18 703	1794	66.4	3332	320
Romania <sup>d</sup>	19 710	17 620	894	59.9	1897	96
Serbia	7131	5860	822	58.3	936	131
Slovakia <sup>b</sup>	5421	3273	604	62.7	1067	197
Spain	46 771	55 062	1177	59.5	7630	163
Spain, Andalusia	8394	9537	1136	60.0	1427	170
Spain, Aragon	1329	1524	1147	62.5	268	202
Spain, Asturias	1059	1228	1160	62.4	201	190
Spain, Basque country	2166	2571	1187	61.5	264	122
Spain, Cantabria <sup>a</sup>	587	601	1025	61.0	85	145
Spain, Castile and León <sup>a</sup>	2487	2696	1084	63.8	467	188
Spain, Castile-La Mancha <sup>a</sup>	2069	2180	1054	61.6	335	162
Spain, Catalonia	7519	9863	1312	62.3	1410	188
Spain, Extremadura	1100	1221	1110	61.4	191	174
Spain, Galicia	2741	3468	1265	61.9	600	219
Spain, Community of Madrid	6454	6739	1044	61.4	1183	183
Spain, Region of Murcia	1467	1845	1258	61.7	251	171
Spain, Navarre <sup>a</sup>	636	714	1122	61.9	79	124
Spain, Valencian region	5005	6495	1298	62.7	853	170
Sweden	9696	9263	955	59.5	1641	169
Switzerland <sup>b</sup>	8230	2834	344	68.1	540	66
The Netherlands	16 865	16 311	967	59.9	1991	118
Tunisia, Sfax region <sup>b</sup>	1186	806	678	58.2	140	118
Turkey <sup>e</sup>	77 696	71 318	918		2821	36
Ukraine	42 903	6742	157		902	21
UK, England <sup>a</sup>	54 317	49 698	915	58.4	8043	148
UK, Northern Ireland <sup>a</sup>	1840	1598	868	58.2	243	132
UK, Scotland	5348	4757	890	56.5	724	135
UK, Wales <sup>a</sup>	3092	2828	915	59.5	483	156
All countries	531 690	490 743	924	60.9	62 962	155

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

DM, diabetes mellitus as cause of renal failure.

<sup>a</sup>Patients younger than 20 years of age are not reported. The true prevalent counts are, therefore, slightly higher than the counts reported here.

<sup>b</sup>Data on prevalence include dialysis patients only.

<sup>c</sup>Data on prevalence of cause of renal failure (DM) include dialysis patients only.

<sup>d</sup>The overall prevalence of RRT is underestimated by approximately 3% due to an estimated 30% underreporting of patients living on a functioning graft.

<sup>e</sup>Data on the prevalence of cause of renal failure (DM) are based on 8897 of 71 318 patients (12.5%).



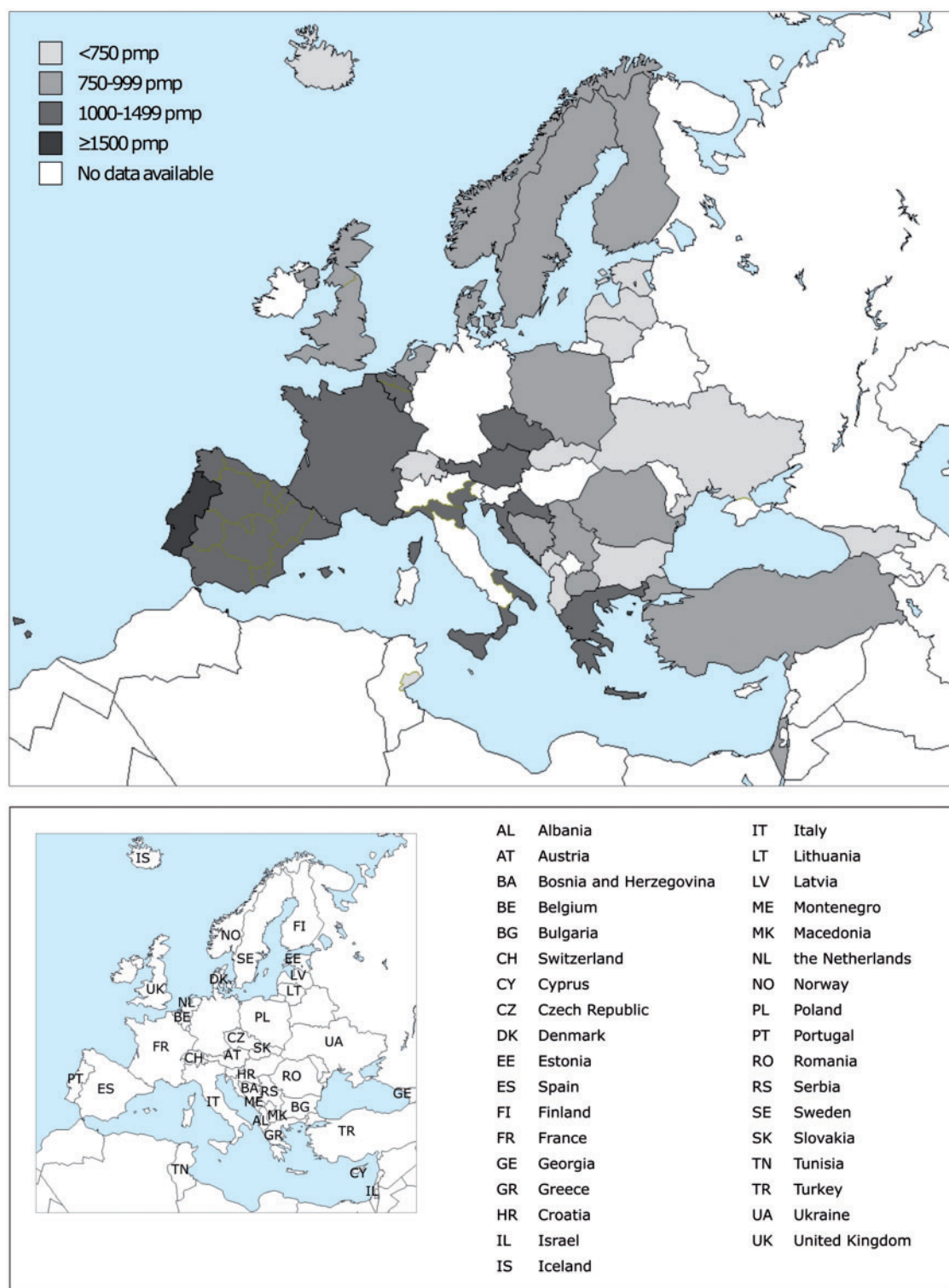


Fig. 5. Unadjusted prevalence per million population by country/region on 31 December 2014. The prevalence rates for Israel, Slovakia, Switzerland and Tunisia (Sfax region) only include patients receiving dialysis. For Romania, the overall prevalence of RRT is underestimated by 3% due to an estimated 30% underreporting of patients living on a functioning graft.

receiving dialysis are expected to live only one-third as long as the age-matched general population. The prospect is even worse for patients aged 55–64 years, as they are expected to live only a quarter as long as their age-matched counterparts in the general population. Patients living with a kidney

transplant fare better than their counterparts receiving dialysis. However, for the transplant recipients aged 20–49 years their life expectancy is still approximately one-third less than that of the age-matched general population. As the age of the transplant recipient increases, the disparity in life

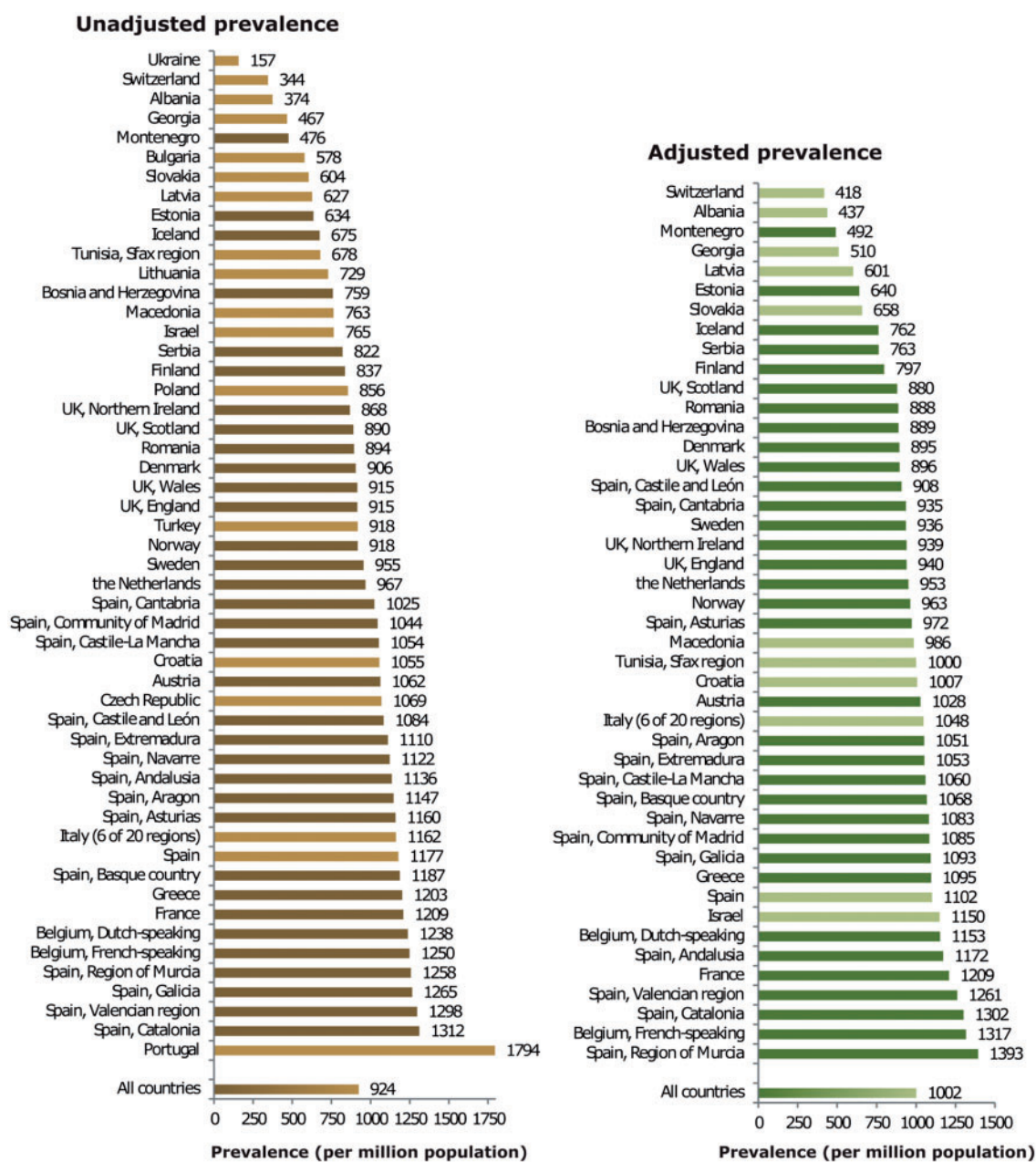


Fig. 6. Unadjusted (left panel) and adjusted (right panel) prevalence per million population by country/region on 31 December 2014. Registries providing individual patient data are shown as dark bars and registries providing aggregated data as light bars. The prevalence rates for Israel, Slovakia, Switzerland and Tunisia (Sfax region) only include patients receiving dialysis. For Romania, the overall prevalence of RRT is underestimated by 3% due to an estimated 30% underreporting of patients living on a functioning graft.

expectancy with the age-matched general population also increases.

### Affiliated registries

Albanian Renal Registry (M. Barbullushi, A. Koroshi and all team of Nephrology); Austrian Dialysis and Transplant Registry (OEDTR) (R.K.); Dutch-speaking Belgian Society of Nephrology (NBVN) (B. De Moor, F. Schroven and J. De Meester); French-speaking Belgian Society of Nephrology (GNFB) (J.M.d.G. and F. Collart); Renal Registry Bosnia and Herzegovina (H.R., L. Lukić and S. Corić); Bulgaria (E.S.V., I. Velinova and M. Gitcheva); Croatian Registry of Renal Replacement Therapy (CRRRT) (I.B., S.

Rački and N. Janković); Cyprus Renal Registry (K.I. and all of the renal units providing data); Czech Republic: Registry of Dialysis Patients (RDP) (I. Rychlík, J. Potucek and F.L.); Danish Nephrology Registry (DNS) (J.G.H.); Estonian Society of Nephrology (Ü. Pechter, M.R. and K. Lilienthal); Finnish Registry for Kidney Diseases (P.F. and C. Grönghagen-Riska); France: The Epidemiology and Information Network in Nephrology (REIN) (M.L. and C. Couchoud); Georgian Renal Registry (N.K. and Dialysis Nephrology and Transplantation Union of Georgia); Hellenic Renal Registry (N.A.); Icelandic End-Stage Renal Disease Registry (R.P.); Israel National Registry of Renal Replacement Therapy (R. Dichtiar, T. Shohat and E.G.); Italian Registry of Dialysis and Transplantation (RIDT) (M.N., M.

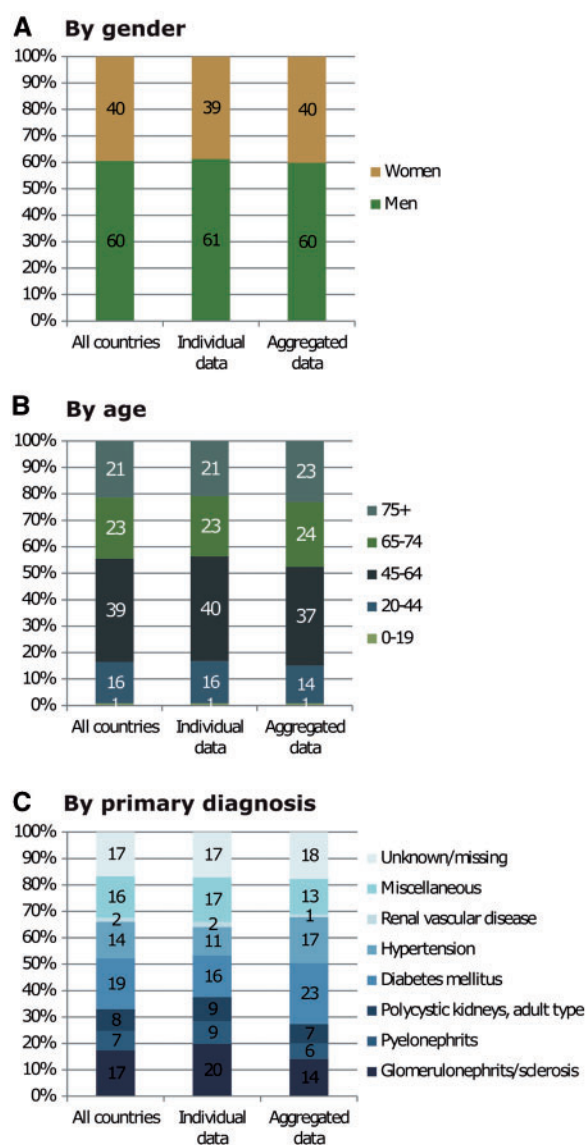
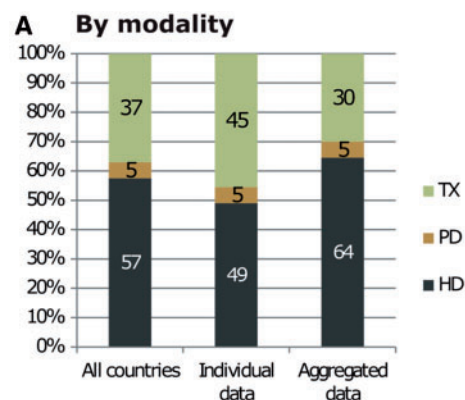


Fig. 7. Unadjusted prevalent percentages by (A) gender, (B) age and (C) primary renal diagnosis on 31 December 2014. See Appendix 1 for a list of countries and regions supplying individual patient level or aggregated level data.

Postorino and A. Limido); Latvian Renal Registry (H.C. and V. Kuzema); Lithuanian Renal Registry (V. Kuzminskis, I.A. Bumblýtė and E.Ž.); Macedonian Renal Registry (L. Trpenovski, Z. Seljami and O.S.-T.); Montenegrin Renal Registry (M.R., D. Radunovic and V. Prelevic); Norwegian Renal Registry (T. Leivestad, A.V. Reisæter and A.Å.); Polish Renal Registry (B.R., M. Klinger and G. Korejwo); Portuguese Renal Registry (F.M., F. Nolasco and R. Filipe); Romanian Renal Registry (RRR) (G. Mircescu, L.G. and E. Podgoreanu); Renal Registry in Serbia (Working Group of Serbian RRT Registry and all of the Serbian renal units); Slovakian Renal Registry (V.S., I. Lajdová and M. Karolyova); Spanish RRT National Registry at ONT, Spanish Regional Registries and Spanish Society of Nephrology (SEN) and the regional registries of Andalusia (SICATA) (P.C.d.I.N., Aragon (J.I. Sanchez Miret and J.M. Abad Diez), Asturias (R. A.d.I.T., J.R. Quirós and RERCA Working Group), Basque country



The figures below are only based on data from registries providing individual patient data.

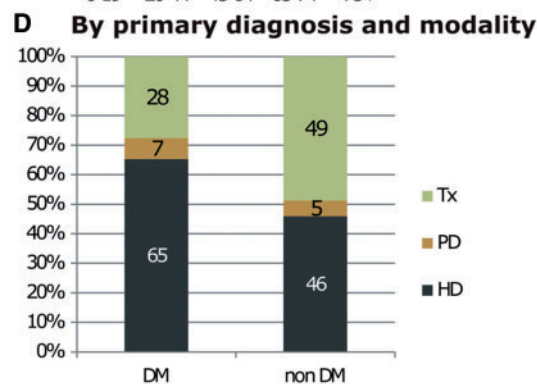
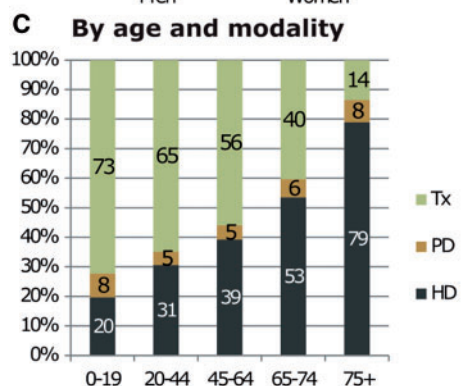
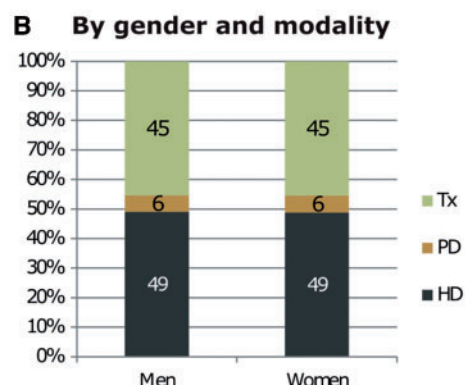


Fig. 8. Unadjusted prevalent percentages of (A) established therapy overall, and established therapy by (B) gender, (C) age and (D) primary renal diagnosis on 31 December 2014. (B)–(D) are only based on data from registries providing individual patient data. See Appendix 1 for a list of countries and regions supplying individual patient level or aggregated level data. HD, haemodialysis; PD, peritoneal dialysis; Tx, transplant; DM, diabetes mellitus.



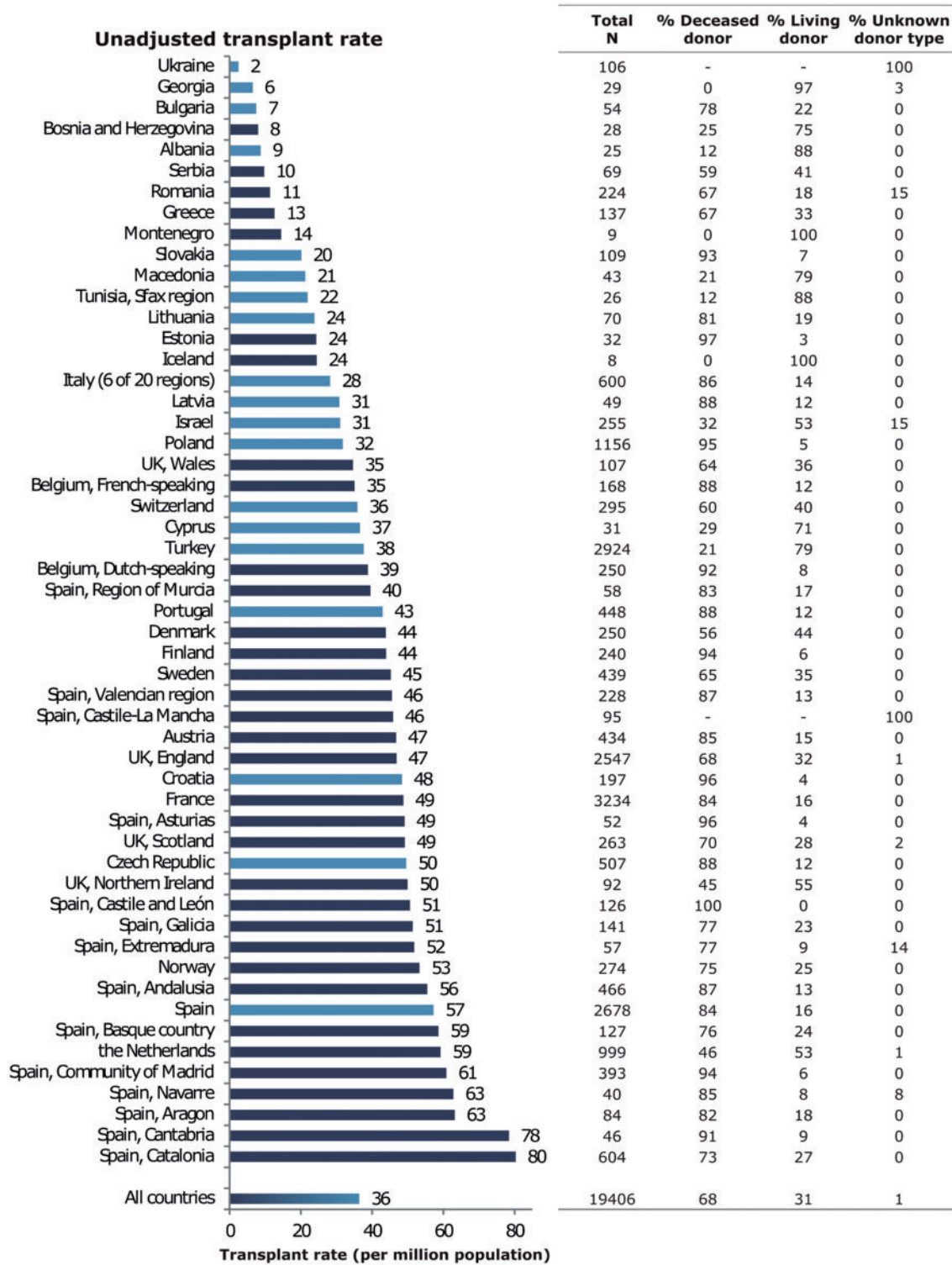


Fig. 9. Kidney transplants performed in 2014, as counts and per million population (unadjusted) by country/region. Registries providing individual patient data are shown as dark bars and registries providing aggregated data as light bars. Data based on patients aged  $\geq 20$  years in Dutch-speaking Belgium, French-speaking Belgium, Montenegro, the Spanish regions of Cantabria, Castile and León, Castile-La Mancha and Navarre, and the UK: England, Northern Ireland and Wales. The total count for Austria is based on residents and non-residents. For Romania the transplantation activity reflects 70% of the total transplantation activity in the country due to an underreporting of pre-emptive transplantation.



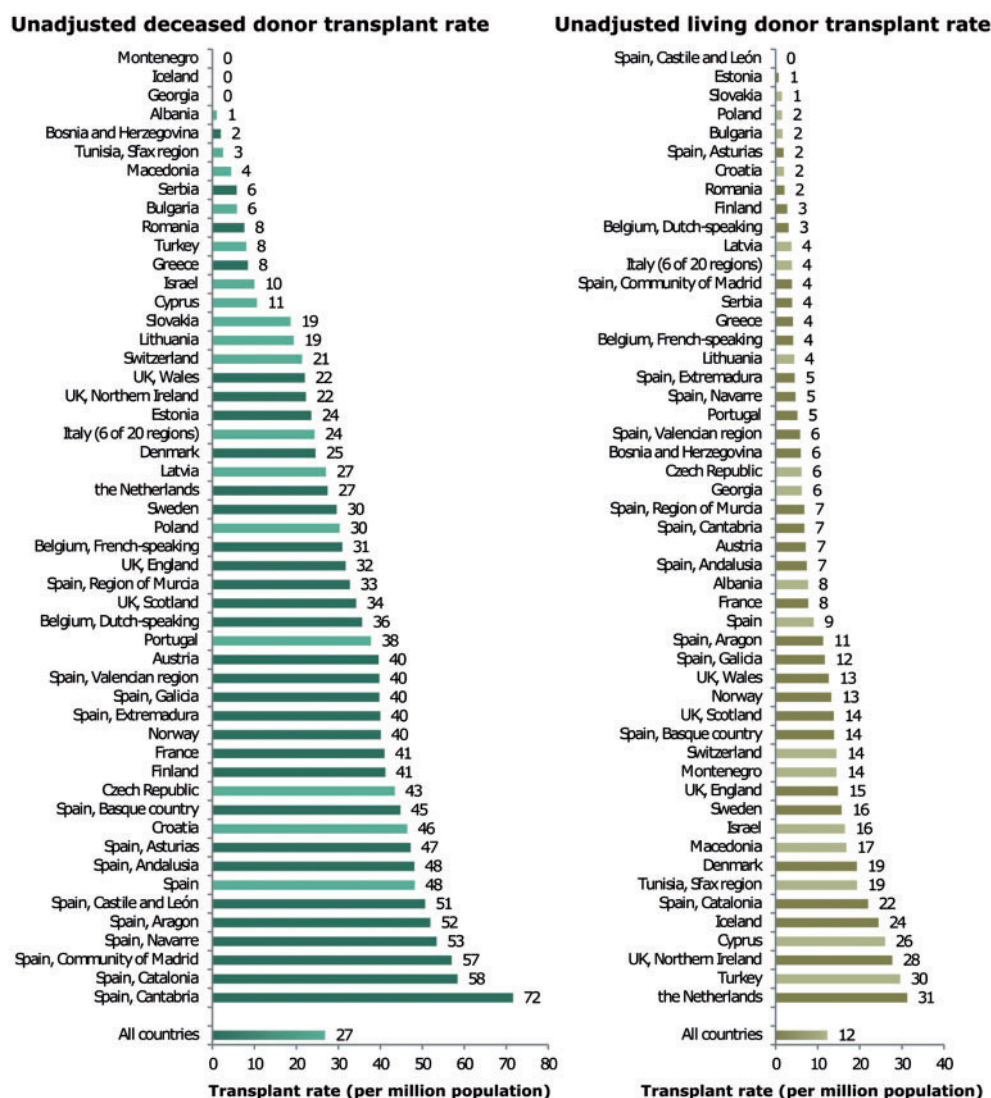


Fig. 10. Unadjusted deceased donor (left panel) and living donor (right panel) kidney transplants per million population performed in 2014 by country/region. Registries providing individual patient data are shown as dark bars and registries providing aggregated data as light bars. Data based on patients aged  $\geq 20$  years in Dutch-speaking Belgium, French-speaking Belgium, Montenegro, the Spanish regions of Cantabria, Castile and León, Castile-La Mancha and Navarre, and the UK: England, Northern Ireland and Wales. The total count for Austria is based on residents and non-residents. For Romania, the transplantation activity reflects 70% of the total transplantation activity in the country due to an underreporting of pre-emptive transplantation.

(UNIPAR) (Á.M., J. Aranzabal, M. Rodrigo and I. Moina), Cantabria (M. Arias Rodríguez and O. García Ruiz), Castile and León (R.G. and C. Fernández-Renedo), Castile-La Mancha (G. Gutiérrez Ávila and I.M.A.), Catalonia (RMRC) (E. Arcos, J. Comas and J. Tort), Extremadura (J.M. Ramos Aceitero and M.A.G.B.), Galicia (E.B.C. and J. Sánchez-Ibáñez), Community of Madrid (M.I.A.M.), Renal Registry of the Region of Murcia (C.S.d.P. and I. Marín Sánchez), Navarre (M.F.S.R., J. Manrique Escola and J. Arteaga Coloma) and the Valencian region (REMRENAL) (C. Alberich Martí and M.F.A.); Swedish Renal Registry (SNR) (K.G. Prütz, M.E.S., M. Evans, S. Schön, L. Bäckman and M. Segelmark); Swiss Dialysis Registry (P. Ambühl and R. Winzeler); Dutch Renal Registry (RENINE) (M.H.H. and A. Hemke); Tunisia, Sfax region (D. Zalila, S. Toumi and F.J.); Registry of the Nephrology, Dialysis and Transplantation in Turkey (TSNNR) (G. Süleymanlar, N.S. and K. Ateş); Ukrainian Renal Data System (URDS) (M.K., S.

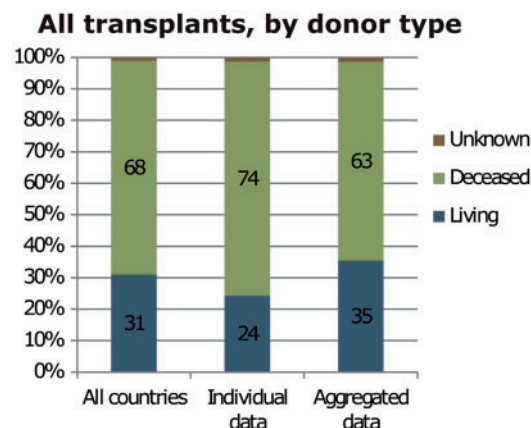


Fig. 11. Percentage of kidney transplants performed in 2014 by kidney donor type. See Appendix 1 for a list of countries and regions supplying individual patient level or aggregated level data.

Table 3. The 1-, 2- and 5-year survival probabilities by treatment modality and cohort from day 1 of the start of RRT/dialysis or from the day of transplantation

Survival probabilities as percentage (95% CI)					
Cohort: 2005–09			Cohort: 2008–12		
	1 year	2 year	5 year	1 year	2 year
Patient survival on RRT					
Unadjusted	82.7 (82.5–82.8)	72.0 (71.8–72.1)	49.4 (49.2–49.5)	83.8 (83.6–84.0)	73.7 (73.5–73.9)
Adjusted <sup>a</sup>	90.0 (89.9–90.2)	82.8 (82.6–83.0)	63.3 (63.0–63.6)	90.6 (90.4–90.7)	83.8 (83.6–84.0)
Patient survival on dialysis (with kidney transplantation as a censored observation)					
Unadjusted	81.7 (81.5–81.9)	69.7 (69.5–69.9)	41.5 (41.3–41.6)	82.7 (82.6–82.9)	71.3 (71.1–71.4)
Adjusted <sup>a</sup>	88.1 (87.9–88.2)	79.5 (79.2–79.7)	55.7 (55.3–56.1)	89.0 (88.9–89.2)	81.1 (80.8–81.3)
Patient survival after first kidney transplantation (deceased donor)					
Unadjusted	96.1 (95.8–96.3)	94.2 (93.9–94.5)	87.9 (87.5–88.3)	96.4 (96.1–96.6)	94.4 (94.1–94.6)
Adjusted <sup>b</sup>	97.6 (97.4–97.8)	96.4 (96.2–96.6)	92.3 (91.9–92.7)	98.0 (97.8–98.1)	96.8 (96.6–97.0)
Graft survival after first kidney transplantation (deceased donor)					
Unadjusted	90.9 (90.6–91.2)	88.1 (87.7–88.4)	79.0 (78.6–79.4)	91.2 (90.9–91.5)	88.3 (88.0–88.6)
Adjusted <sup>b</sup>	92.2 (91.8–92.5)	89.7 (89.3–90.1)	81.6 (81.1–82.2)	92.7 (92.4–93.0)	90.2 (89.8–90.6)
Patient survival after first kidney transplantation (living donor)					
Unadjusted	98.4 (98.1–98.7)	97.5 (97.1–97.8)	94.2 (93.7–94.7)	98.8 (98.6–99.0)	97.9 (97.6–98.2)
Adjusted <sup>b</sup>	98.8 (98.6–99.1)	98.2 (97.9–98.5)	95.7 (95.2–96.2)	99.2 (99.0–99.3)	98.6 (98.3–98.8)
Graft survival after first kidney transplantation (living donor)					
Unadjusted	95.5 (95.0–95.9)	93.6 (93.0–94.1)	87.0 (86.4–87.7)	96.3 (95.9–96.6)	94.5 (94.1–94.9)
Adjusted <sup>b</sup>	95.5 (95.0–96.0)	93.7 (93.1–94.2)	87.0 (86.3–87.8)	96.3 (96.0–96.7)	94.6 (94.2–95.1)

This is based on data from the following registries providing individual patient data: Austria, Belgium (Dutch-speaking), Belgium (French-speaking), Belgium (Dutch-speaking), 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 (Extremadura), Spain (Galicia), Spain (Valencian region), Sweden, the Netherlands and the UK (all countries).

<sup>a</sup>Analyses were adjusted using fixed values: age (60 years), gender (60% men) and primary renal disease (20% diabetes mellitus, 17% hypertension/renal vascular disease, 15% glomerulonephritis and 48% other causes).

<sup>b</sup>Analyses were adjusted using fixed values: age (45 years), gender (60% men) and primary renal disease (10% diabetes mellitus, 8% hypertension/renal vascular disease, 28% glomerulonephritis and 54% other causes).

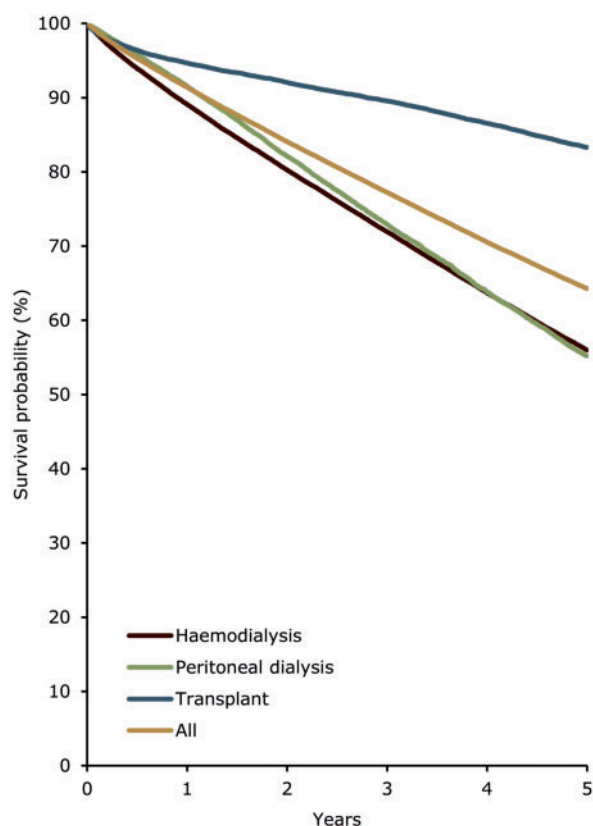


Fig. 12. The 5-year adjusted survival probability of incident dialysis patients (commencing RRT between 2005 and 2009) and patients receiving a first transplant (between 2005 and 2009) from day 91 by modality, adjusted for age, gender and primary renal diagnosis. Survival on dialysis was examined using the Cox regression method, with transplantation as a censored event (see the ERA-EDTA 2014 Annual Report for the full methods). Analyses were adjusted using fixed values: age (60 years), gender (60% men) and primary renal diagnosis (20% diabetes mellitus, 17% hypertension/renal vascular disease, 15% glomerulonephritis and 48% other causes). This figure is based on data from the following registries providing individual patient data: Austria, Belgium (Dutch-speaking), Belgium (French-speaking), 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 (Extremadura), Spain (Galicia), Spain (Community of Madrid), Spain (Region of Murcia), Spain (Valencian region), Sweden, the Netherlands and the UK (all countries).

Nikolaenko and O. Dubyna); UK Renal Registry (UKRR) (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).

### ERA-EDTA Registry committee members

A. Więcek, Poland (ERA-EDTA President); Z.M., France (Chairman); F.J.C., UK; C. Couchoud, France; M. Evans, Sweden; P.F., Finland; J.W. Groothoff, the Netherlands; J. Harambat, France; J.G.H., Denmark; F.J., Tunisia; Mar.N., Italy; and I. Rychlik, Czech Republic.

### ERA-EDTA Registry office staff

K.J.J. (Managing Director), M.B. (for the paediatric section), R. Cornet, G. Guggenheim, A.K., Mau.N., M.P., V.S.S. and A.J. Weerstra.

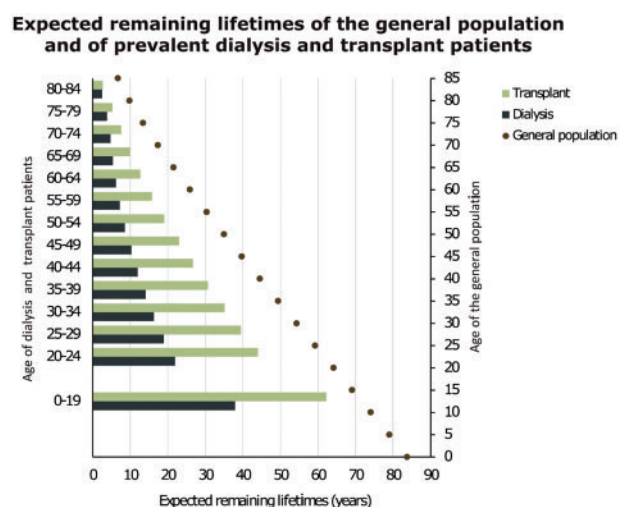


Fig. 13. Expected remaining lifetimes of the general population in 2013 and 2014, and of prevalent dialysis and transplant patients in 2013 and 2014 (includes mortality in the first 90 days), by age and gender. This figure is based on data from the following registries providing individual patient data: 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 (Castile and León), Spain (Castile-La Mancha), Spain (Catalonia), Spain (Extremadura), Spain (Galicia), Spain (Community of Madrid), Spain (Region of Murcia), Spain (Valencian region), Sweden, the Netherlands and the UK (all countries).

### Conflict of interest statement

None declared.

### Acknowledgements

The ERA-EDTA 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 would like to thank the persons and organizations listed in the paragraph 'affiliated registries' for their contribution to the work of the ERA-EDTA Registry. The ERA-EDTA Registry is funded by the European Renal Association – European Dialysis and Transplant Association (ERA-EDTA). This article was written by M.P. et al. on behalf of the ERA-EDTA Registry, which is an official body of the ERA-EDTA.

### References

1. ERA-EDTA Registry. ERA-EDTA Registry Annual Report 2014. Amsterdam, The Netherlands: Academic Medical Center, Department of Medical Informatics, 2016
2. Noordzij M, Kramer A, Abad Diez JM et al. Renal replacement therapy in Europe: a summary of the 2011 ERA-EDTA Registry Annual Report. *Clin Kidney J* 2014; 7: 227–238
3. Pippias M, Stel VS, Abad Diez JM et al. Renal replacement therapy in Europe: a summary of the 2012 ERA-EDTA Registry Annual Report. *Clin Kidney J* 2015; 8: 248–261
4. Kramer A, Pippias M, Stel VS et al. Renal replacement therapy in Europe: a summary of the 2013 ERA-EDTA Registry Annual

Report with a focus on diabetes mellitus. *Clin Kidney J* 2016; 9: 457–469

## Appendix 1

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

*Countries or regions providing aggregated patient level data.* Albania, Bulgaria, Croatia, Cyprus, Czech Republic, Georgia, Israel, Italy, Latvia, Lithuania, Macedonia, Poland, Portugal, Slovakia, Spain, Switzerland, Tunisia (Sfax region), Turkey and Ukraine.

## Appendix 2

Analyses for patient survival on RRT and dialysis were adjusted using the following fixed values: age (60 years), gender (60% men) and primary renal diagnosis (20% diabetes mellitus, 17% hypertension/renal vascular disease, 15% glomerulonephritis and 48% other causes).

Analyses for patient and graft survival after a first kidney transplant were adjusted using the following fixed values: age (45 years), gender (60% men) and primary renal diagnosis (10% diabetes mellitus, 8% hypertension/renal vascular disease, 28% glomerulonephritis and 54% other causes).

The survival analyses presented here were based on data from Austria, Dutch- and French-speaking Belgium, Denmark, Finland, France, Greece, Iceland, Norway, the Spanish regions of Andalusia, Aragon, Asturias, Basque country, Cantabria, Castile and León, Castile-La Mancha, Catalonia, Extremadura, Galicia and Valencian region, Sweden, the Netherlands and the UK.