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Chapter Thirteen

international comparisons



Humanity finds itself in the midst of the world. In the midst of all other creatures humanity is the most significant and yet the most dependent upon the others.

HILDEGARDE OF BINGEN, *Scivias*

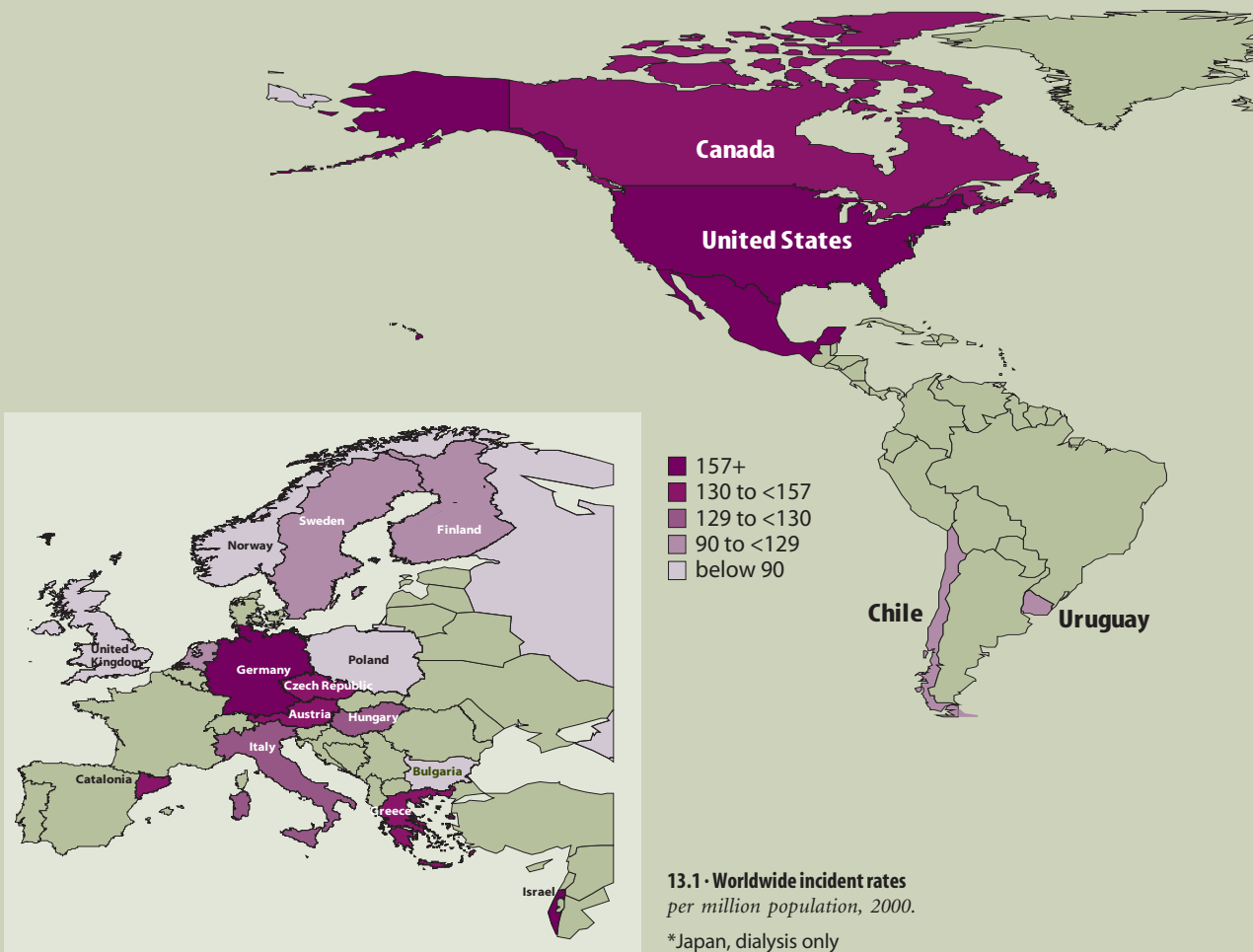


International comparisons of end-stage renal disease (ESRD) treatment provide a broad context for the data presented in the rest of the ADR, helping to show the relationship between the United States ESRD program and other programs around the world. On the 2000 data collection form we requested patient counts, by age group, for ESRD incidence (including diabetic nephropathy), prevalence (overall and by modality), and transplant activity, along with national census information to use in calculating unadjusted patient rates per million population (pmp). We received responses from 23 countries.

Worldwide prevalence of treated ESRD continues to climb, with rates highest in Japan, Taiwan and the United States (1,300–1,600 per million population), and lowest in Russia,

Bangladesh, and the Philippines (66, 53, and 50 pmp). The wide variation in these rates illustrates that resources available to support ESRD programs are subject to government infrastructures and per capita income. Additional information on the international scope of ESRD is provided by the International Federation of Renal Registries (IFRR), at www.health-tech-net.org/ifrr.

Despite clear worldwide differences in policy regarding ESRD treatment, international comparisons of ethnic populations provide valuable insight into the provision of care in the U.S. compared to other nations. Asian ESRD populations, for example, are well documented in the U.S. data, and can be compared to populations in Japan and Taiwan. The prevalent rates of treated ESRD in Japan and Taiwan were 1,624 and



1,352 patients pmp in 2000, respectively, while the point prevalent rate of treated Asian ESRD patients in the U.S. was 1,266. Incident rates, in contrast, were 252 and 311 pmp in Japan and Taiwan, but almost 400 pmp in the U.S. These differences may be related to patient acceptance rates and to survival time on ESRD.

As reported by the IFRR, Mexico has a prevalent rate of 361 pmp, and an incident rate of 181 pmp. These are significantly lower than the reported rates for Hispanics in the U.S., currently almost 1,000 and 454 pmp, respectively. Such differences in worldwide rates merit further investigation.

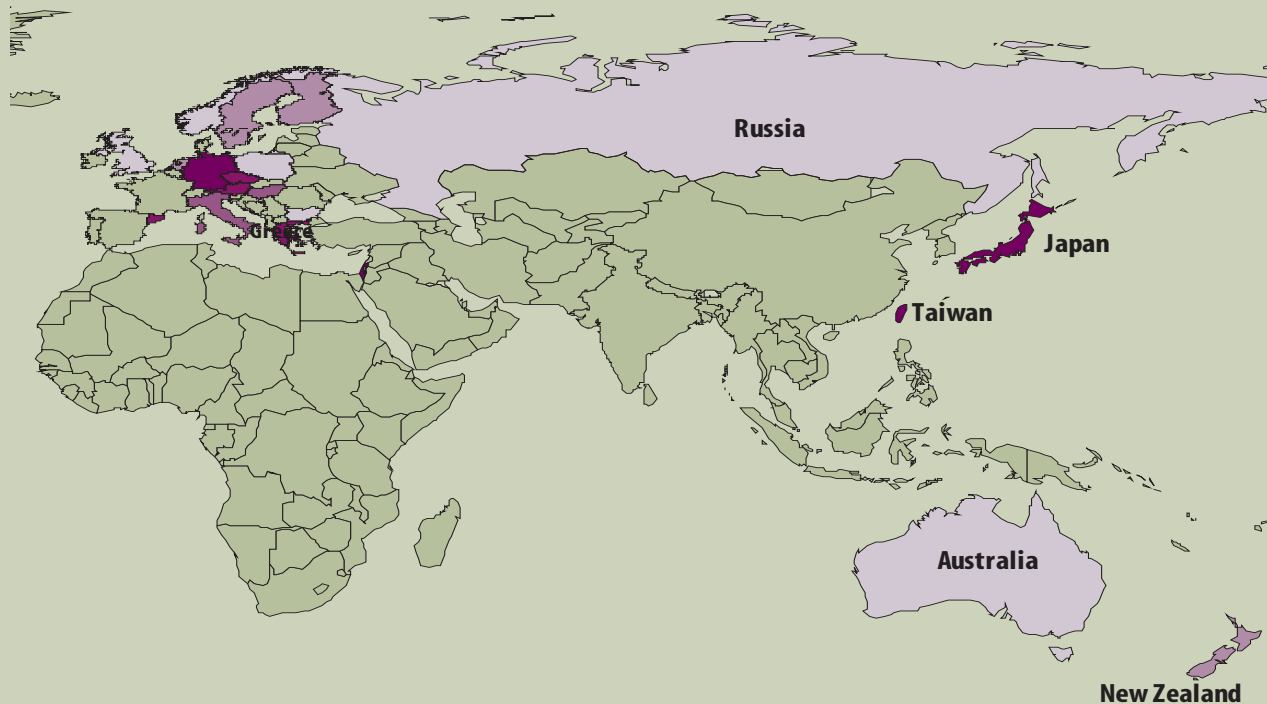
There are notable differences in rates by age groups. The highest prevalent rates for patients younger than 20, for example, occur in Finland (90 pmp), followed by the U.S. and the Netherlands (77 and 73 pmp). In all other age groups,

however, U.S. rates exceed those of other countries (not all countries provided data by age group).

The use of peritoneal dialysis (CAPD and CCPD) varies considerably from country to country, with the therapy being most popular in Australia and New Zealand. By age group, home therapies are used more frequently in pediatric patients (with the exception of Norway), with use of these therapies decreasing by patient age.

Transplant rates are highest in Catalonia, the U.S., Austria, and Norway (above 45 pmp), and these same countries, with the addition of Sweden, also have the highest rates of functioning grafts.

We invite all registries to send us their data using the form on page 259, returning it to us by email (usrds@usrds.org) or fax (1.612.347.5878).



Worldwide variation in prevalence rates can be attributed to a number of factors. Previous data, for example, have shown that treatment is related to a country's per capita income and governmental infrastructure, each of which can significantly influence the availability and quality of dialysis and transplant services. In addition, countries with excellent survival rates accumulate prevalent patients under ESRD treatment. The best examples of this phenomenon are Japan, Taiwan, and the U.S., in which prevalent rates fall between 1,300 and 1,600 per million population (Table 13.a and Figure 13.2).

Of the countries providing prevalent rates by age group, Finland has the highest prevalence of treated children with ESRD and Bangladesh the lowest (Figure 13.3). These extremes correlate with differences in national per capita income: for the year 2000, the World Bank reported an average income of \$25,130 in Finland, and only \$370 in Bangladesh (www.worldbank.org). In the 2003 ADR we will explore in more depth the relationship between the incidence and prevalence of treated ESRD and a nation's economic indicators.

The percent of incident ESRD patients with diabetes as the cause of renal failure is highest in Brunei and the U.S. (45.1 percent and 45.4 percent, respectively; Table 13.b and Figure 13.4). Interestingly, Brunei, Norway, Greece, Germany, and Taiwan all showed an increase in ESRD due to diabetes of more than ten percent over the last three years. In Japan, Germany, the Czech Republic, Austria, Canada, Taiwan, and Finland, diabetes was the cause of ESRD in more than 30 percent of incident patients.

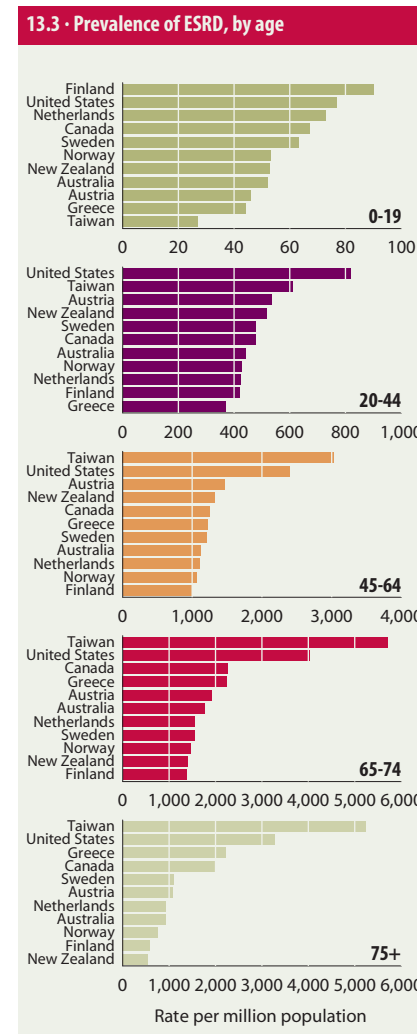
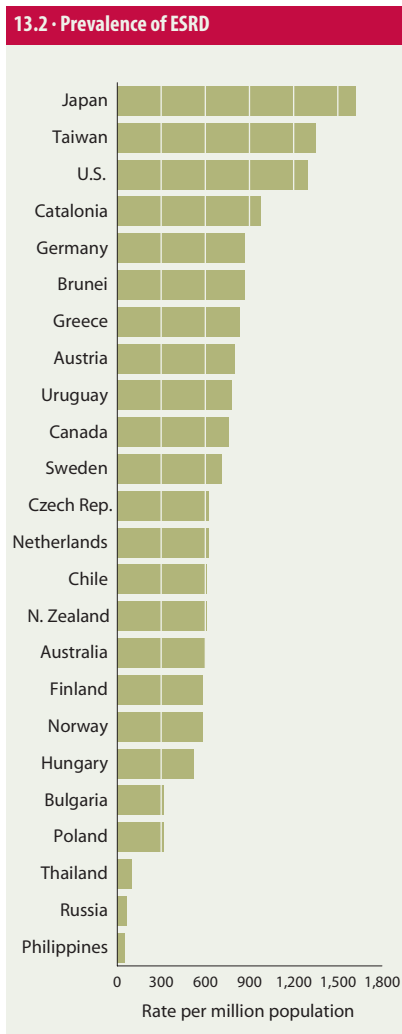
The diabetic burden in Latin America is of particular interest. Rates of the disease are perhaps related to the mix of native and immigrant populations. In Chapter Two we show that rates of diabetes in U.S. ESRD patients of Mexican Hispanic origin are as high as 65 percent, and 55 percent in Hispanics of other origins. Such data should be confirmed by comparison to data from other countries.

The diabetic population clearly continues to grow, with the disease remaining the leading cause of ESRD worldwide. The increasing burden of this disease and of ESRD treatment itself suggest that international programs to address populations at high risk for developing chronic kidney disease and ESRD are sorely needed around the world.

Data in each table & figure are presented only for those countries from which the relevant information was available.

Tables 13.a-c per million population. **Figures 13.1-6** 2000.

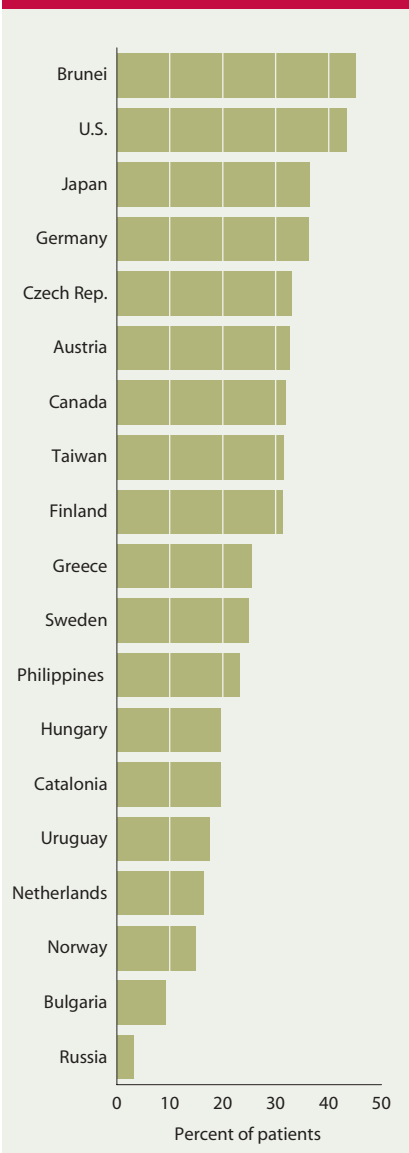
	Prevalent counts			Prevalent rates		
	1998	1999	2000	1998	1999	2000
Australia	10,408	11,045	11,593	555.1	582.3	605.2
Austria	5,995	6,215	6,423	748.2	772.9	798.5
Bangladesh	5,239	5,922	6,746	41.9	47.0	52.7
Brunei	232	243	293	718.0	734.8	865.8
Bulgaria	2,732	2,647	2,526	333.2	322.8	319.7
Canada	20,166	21,863	23,411	663.8	717.0	761.3
Catalonia	5,659	5,906	6,125	920.5	951.4	978.1
Chile	7,594	8,516	9,301	512.4	567.1	611.5
Czech Republic	5,626	5,916	6,374	551.6	580.0	624.9
Finland	2,657	2,820	3,014	515.6	545.9	582.3
Germany	62,657	59,443	71,513	763.8	723.5	870.2
Greece	7,548	8,079	8,735	718.1	767.8	830.2
Hungary	4,394	4,827	5,279	435.0	477.9	517.7
Israel	2,913	3,217	.	482.2	518.6	.
Italy	38,638	44,071	.	674.2	769.0	.
Japan	186,251	197,213	206,134	1,472.5	1,556.7	1,624.1
Netherlands	9,073	9,486	9,851	577.6	599.9	621.0
New Zealand	2,060	2,209	2,339	543.2	579.7	610.6
Norway	2,318	2,429	2,606	523.1	544.4	580.3
Philippines	.	1,296	3,861	.	17.3	50.5
Poland	9,766	10,672	12,208	252.6	276.1	315.9
Russia	8,090	8,792	9,655	55.1	59.7	65.7
Sweden	5,914	6,116	6,319	672.4	695.1	712.3
Thailand	3,266	4,736	5,963	54.4	78.9	99.4
United States	344,603	361,921	378,862	1,224	1,275	1,298
Uruguay	2,325	2,408	2,473	734.9	761.1	781.7



13.b · Percent of incident patients with diabetes

	1998	1999	2000
Austria	30.0	31.3	32.7
Brunei	32.3	39.0	45.1
Bulgaria	.	.	9.6
Canada	30.0	31.3	32.0
Catalonia	19.8	19.0	19.9
Czech Republic	31.0	.	33.0
Finland	33.6	31.9	31.4
Germany	33.0	34.6	36.2
Greece	21.6	21.5	25.5
Hungary	18.3	21.1	19.9
Italy	.	15.3	.
Japan	36.2	35.0	36.5
Netherlands	15.5	14.0	16.7
Norway	10.2	12.1	15.2
Philippines	62.0	19.9	23.4
Russia	.	.	3.6
Sweden	23.0	21.7	25.1
Taiwan	28.7	29.8	31.7
United States	43.5	43.4	43.4
Uruguay	16.4	18.9	17.8

13.4 · Percent of incident patients with diabetes



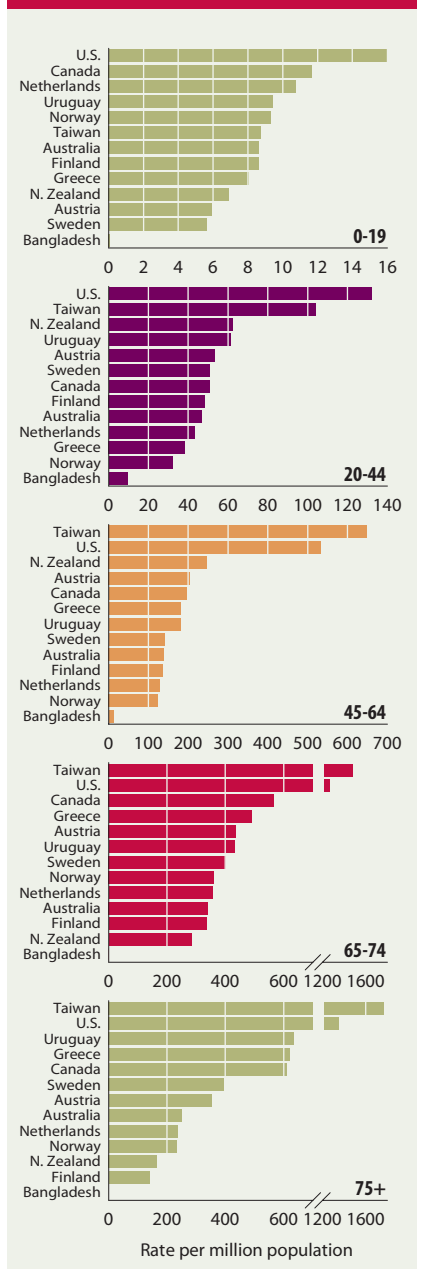
13.c · Incidence of ESRD

	1998	1998	2000
Australia	86	92	90
Austria	129	135	133
Bangladesh	6	5	6
Brunei	192	178	210
Bulgaria	73	78	78
Canada	138	146	143
Catalonia	135	150	143
Chile	121	147	126
Czech Republic	133	128	151
Finland	90	90	94
Germany	148	148	175
Greece	114	124	157
Hungary	127	123	129
Israel	152	176	.
Italy	104	130	.
Japan	234	249	252
Netherlands	94	98	93
New Zealand	98	98	107
Norway	90	89	89
Philippines	11	18	27
Poland	52	58	66
Russia	20	20	15
Sweden	127	125	126
Taiwan	288	315	311
United Kingdom	77	.	.
United States	313	325	337
Uruguay	137	145	126

13.5 · Incidence of ESRD



13.6 · Incidence of ESRD, by age



Modalities of treatment vary widely around the world, reflecting differences in healthcare systems and in cultural perspectives on the human body. In New Zealand and Australia, for example, 60 to 70 percent of the dialysis population is treated with a home therapy, either peritoneal dialysis or home hemodialysis (Table 13.d and Figure 13.7). New Zealand patients are more likely than those of any other reporting country to be treated with peritoneal dialysis, while home hemodialysis is used in almost one-fifth of Australian patients. Such figures are in marked contrast to those of countries such as Japan, in which 95 percent of patients are treated with in-center hemodialysis.

In most countries home hemodialysis is used rarely, if at all. Since 1998, only 0.5 percent of the U.S. dialysis population has been treated with this therapy. But as new information continues to become available on overnight and daily dialysis, the use of home treatments may begin to increase. Long overnight dialysis has, indeed, been used in Tassin, France for many years; readers are referred to publications about this treatment.

The use of home therapy is most likely in younger patients, while most older patients (except for those in New Zealand and Australia) are treated with hemodialysis (Figure 13.8).

The use of transplant as a modality also differs widely around the world. Prevalent rates for patients with functioning grafts, for example, vary from a high of 437 per million population in Norway to a low of 2.6 in Bangladesh (Table 13.e and Figure 13.9). Increases over time in the prevalent rates of functioning grafts suggest improved graft survival, illustrated in Chapter Eight for the U.S. transplant population.

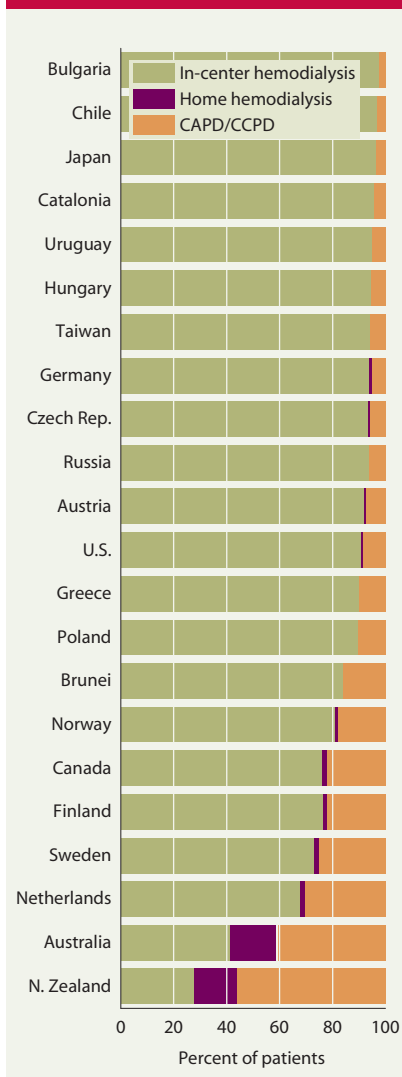
Seven of the nine countries with transplant rates of more than 30 per million population are European, with the U.S. and Canada ranked second and fifth (Table 13.f and Figure 13.10). Transplant rates for children are highest in the Netherlands, Finland, and Norway, and in Norway the rate for elderly patients is more than five times higher than in any other country (Figure 13.11)

National economies and infrastructures, the willingness to provide reimbursement for immunosuppressive medications, and cultural attitudes toward transplantation all affect the use of transplant as a treatment for ESRD. In addition, any efforts to expand transplant programs are limited by organ availability, a problem existing worldwide.

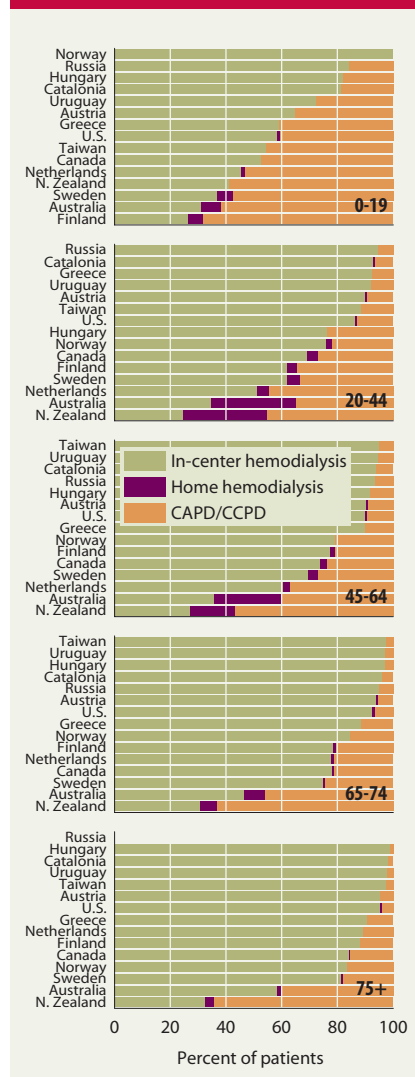
13.d · Percent distribution of prevalent dialysis patients, by modality

	Hemodialysis			Peritoneal dialysis			Home hemodialysis		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
Australia	40.2	40.8	41.2	42.6	41.9	41.5	17.2	17.4	17.3
Austria	92.2	91.8	91.9	7.6	7.9	7.8	0.2	0.3	0.3
Brunei	88.7	85.8	83.5	11.3	14.2	16.5	0.0	0.0	0.0
Bulgaria	96.2	96.3	97.2	3.8	3.7	2.8	0.0	0.0	0.0
Canada	72.2	74.3	76.0	26.3	24.0	22.2	1.6	1.8	1.8
Catalonia	94.7	95.2	95.4	5.2	4.7	4.6	0.2	0.1	0.0
Chile	96.4	96.6	96.3	3.6	3.4	3.7	0.1	0.0	0.0
Czech Republic	.	.	93.3	.	.	6.7	.	.	0.1
Finland	73.0	73.5	76.0	26.4	25.0	22.6	0.6	1.5	1.4
Germany	91.1	92.8	93.7	7.3	6.2	5.4	1.6	1.0	0.9
Greece	89.6	89.6	89.5	10.3	10.4	10.5	0.0	0.0	0.0
Hungary	96.7	95.8	94.1	3.3	4.2	5.9	0.0	0.0	0.0
Italy	.	88.6	.	.	10.6	.	.	0.8	.
Japan	95.2	95.5	95.8	4.7	4.5	4.2	0.0	0.0	0.0
Netherlands	68.4	67.6	67.6	29.8	30.5	30.6	1.8	1.8	1.7
New Zealand	22.7	25.7	27.9	58.7	58.6	56.6	18.6	15.6	15.5
Norway	81.3	83.4	81.2	18.6	16.4	18.5	0.2	0.2	0.3
Poland	89.4	89.7	89.4	10.6	10.3	10.6	0.0	0.0	0.0
Russia	93.4	93.6	93.2	6.6	6.4	6.8	0.0	0.0	0.0
Sweden	72.4	72.1	72.8	25.6	25.8	25.3	1.9	2.1	1.9
Taiwan	95.1	94.7	93.9	4.9	5.3	6.1	0.0	0.0	0.0
United States	89.0	90.0	90.7	10.5	9.5	8.8	0.5	0.5	0.5
Uruguay	95.6	94.1	94.4	4.4	5.9	5.6	0.0	0.0	0.0

13.7 · Distribution of prevalent dialysis patients



13.8 · Prevalent dialysis patients, by age



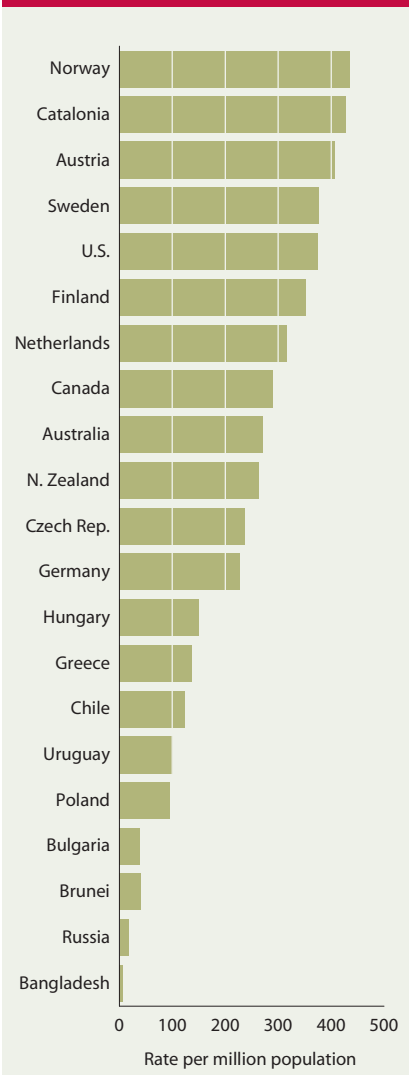
13.e · Prevalent rates of functioning grafts			
	1998	1999	2000
Australia	259.6	265.3	273.3
Austria	364.2	385.8	407.4
Bangladesh	2.3	2.4	2.6
Brunei	31.0	36.3	41.4
Bulgaria	31.1	36.1	43.4
Canada	255.1	273.0	289.8
Catalonia	384.1	403.2	428.5
Chile	108.8	117.4	126.9
Czech Republic	189.6	217.8	240.0
Finland	316.9	331.8	353.2
Germany	179.0	177.5	230.2
Greece	125.0	135.4	139.4
Hungary	135.0	141.7	153.8
Italy	127.7	151.1	.
Netherlands	287.8	298.6	317.2
New Zealand	245.5	256.1	264.7
Norway	401.4	420.4	436.9
Poland	74.7	76.8	97.9
Russia	13.1	15.3	17.1
Sweden	362.9	371.3	377.6
United Kingdom	211.4	.	.
United States	342.9	357.3	375.4
Uruguay	80.9	93.2	104.9

13.f · Transplant rates			
	1998	1999	2000
Australia	28	24	28
Austria	47	53	49
Bangladesh	0.26	0.21	0.36
Brunei	3.1	6.0	5.9
Bulgaria	6	12	7
Canada	34	35	38
Catalonia	61	57	58
Chile	18	18	18
Czech Republic	33	31	34
Finland	36	30	37
Germany	29	28	27
Greece	16	15	12
Hungary	24	22	25
Italy	.	24	.
Netherlands	31	31	36
New Zealand	28	29	28
Norway	46	46	46
Philippines	2.3	2.6	3.5
Poland	14	16	21
Russia	3.2	3.3	3.0
Sweden	40	34	32
Taiwan	9	7	12
United Kingdom	30	29	.
United States	50	50	52
Uruguay	19	13	20

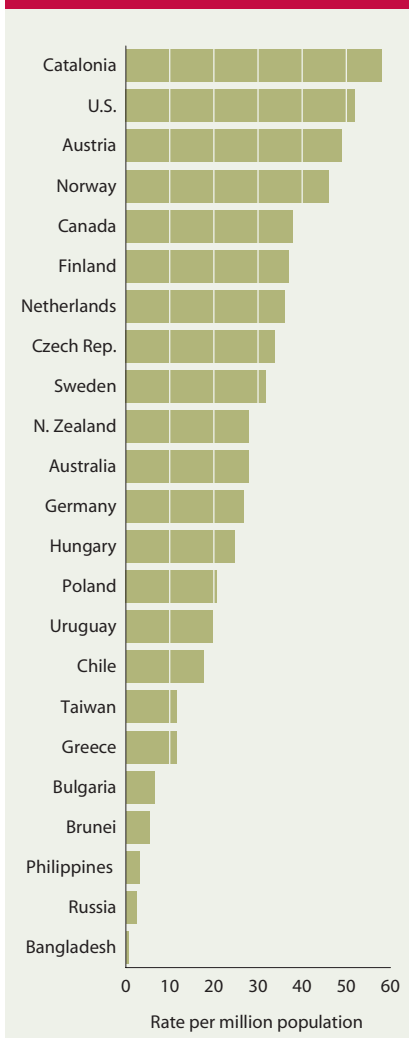
Data in each table & figure are presented only for those countries from which the relevant information was available.

Tables 13.e-f per million population. Figures 13.9-11 2000.

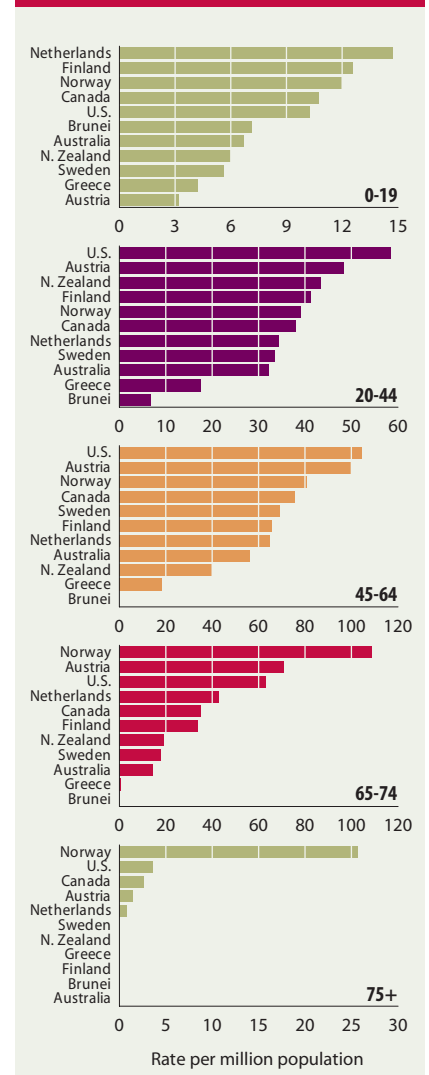
13.9 · Prevalent rates of functioning grafts



13.10 · Transplant rates



13.11 · Transplant rates, by age



Patient populations & analytical methods

- ◆ This year's new data collection form was distributed by the USRDS to all countries with renal registries. On the form we requested, by age group, general population estimates, incident counts (including counts of patients with diabetic nephropathy), prevalent counts (overall and by modality), and counts of living donor and cadaveric transplants.
- ◆ Each registry was asked to provide information for patients treated in the years 1998 to 2000.
- ◆ Using the general population estimates, we calculated unadjusted incident, prevalent, and transplant rates per million population.
- ◆ Additional information was obtained from the IFRR website at www.health-tech-net.org/ifrr.

Conclusions

- ◆ Prevalent rates of treated ESRD continue to rise significantly around the world. Between 1998 and 2000, the largest rate increases occurred in Thailand (83 percent), Poland (25 percent), Brunei (21 percent), Chile, Hungary, and Russia (each at 19 percent). Countries with more established ESRD treatment programs have shown growth rates of 6–16 percent.
- ◆ Prevalent rates are highest in Japan, Taiwan, and the United States.
- ◆ Finland has the highest prevalence of treated ESRD in the pediatric population (almost 90 per million population).
- ◆ Diabetes is the leading cause of ESRD worldwide, occurring in only 3.6 percent of incident patients in Russia but more than 40 percent in both Brunei and the U.S.
- ◆ High rates of diabetes in U.S. ESRD patients of Hispanic origin suggest that the disease should be evaluated in Hispanic populations worldwide.
- ◆ The highest incident rates of ESRD (from 250 to 337 per million population) occur in the U.S., Taiwan, and Japan.
- ◆ The use of dialytic modalities varies significantly worldwide, with Australia and New Zealand having the highest percentage of patients on home dialysis therapy (60–70 percent).
- ◆ Home therapies are used most often in pediatric and young adult populations, while in most countries older patients tend to be placed on hemodialysis.
- ◆ Home hemodialysis is utilized most extensively in Australia and New Zealand.
- ◆ Transplant rates are highest in Catalonia, the U.S., Austria, and Norway (above 45 per million population), and these same counties, with the addition of Sweden, also have the highest rates of functioning grafts.
- ◆ Transplant rates for younger populations generally range between 20 and 50 per million population, and are highest in the Netherlands, Finland, and Norway.
- ◆ Transplant rates for elderly patients in Norway are more than five times higher than those in any other country.
- ◆ The worldwide increase in rates of functioning grafts appears to reflect improved graft survival.
- ◆ Treatment options for ESRD patients are limited by health policies, governmental infrastructure, and gross per capita income.
- ◆ With incident and prevalent rates of treated ESRD continuing to increase worldwide, and diabetes being the largest cause of ESRD, programs to identify those populations at high risk for chronic kidney disease and ESRD are needed in order to reduce the burdens of these diseases around the world.