

Chapter 13: International Comparisons

- Taiwan, the Jalisco region of Mexico, and the U.S. continue to report the highest incidence of treated ESRD, at 455, 421, and 370 patients per million general population (PMP), as they have done for the past decade (Fig. 13.2).
- The greatest proportionate increases in the incidence of treated ESRD over the interval from 2001/02 to 2013/14 (Reference Table N.1) were reported for Thailand (1009%), Bangladesh (643%), Russia (291%), the Philippines (190%), Malaysia (162%), the Republic of Korea (101%), and the Jalisco region of Mexico (93%).
- Incidence rates of treated ESRD have remained relatively stable since 2001/02 in most high-income countries, and have declined by between 3 and 14% in Austria, Denmark, Iceland, Finland, Sweden, and Scotland (Ref. Table N.1).
- In 2014, diabetes mellitus was reported as the primary cause of ESRD for greater than 50% of incident treated ESRD patients in Singapore, Malaysia, and the Jalisco region of Mexico, but for less than 20% of incident ESRD patients in the Netherlands, Dutch-speaking Belgium, Norway, Estonia, Romania, and Iceland (Figure 13.4).
- The greatest increases in diabetes-related ESRD incidence rates from 2001/02 to 2013/14 have occurred in Thailand, Russia, the Philippines, Malaysia, the Republic of Korea, and the Jalisco region of Mexico, where rates have more than doubled over this time period (Reference Table N.2).
- The highest prevalence of treated ESRD in 2014 was reported for Taiwan, Japan, and the U.S. (3219, 2505, and 2076 PMP respectively, Figure 13.9).
- From 2001 to 2014 the prevalence of treated ESRD steadily increased in all countries with reported data. The largest proportionate increases in ESRD prevalence were in the Philippines, Thailand, and the Jalisco region of Mexico, ranging from 343% to 1092% (Reference Table N.4).
- Use of the different renal replacement therapies varies considerably across countries (Figure 13.12). Dialysis is the predominant therapeutic approach for treatment of ESRD in the majority of countries. In the majority of countries, in-center hemodialysis (HD) is utilized for greater than 80% of dialysis provision (Figure 13.15 and Reference Table N.7). The highest utilization of peritoneal dialysis (PD) among dialysis patients in 2014 was seen in Hong Kong (72%), the Jalisco region of Mexico (47%), Thailand (30%), New Zealand (31%), and Colombia (29%).
- In 2014, the percentage of ESRD patients living with a kidney transplant ranged from less than 10% in some Asian and eastern European countries to 50–75% in the Nordic countries (Denmark, Finland, Iceland, Norway, and Sweden), Estonia, the Netherlands, the U.K. (including Scotland), Spain, Austria, and Qatar (Figure 13.12).
- In 2014, the highest rates of kidney transplantation were reported for the Jalisco region of Mexico, the Netherlands, Spain, and the U.S., with 56–60 kidney transplants PMP (Figure 13.16a). When expressed relative to the size of the prevalent dialysis population, the highest rates of kidney transplantation per 1000 dialysis patients occurred in Norway (205 per 1000), the Netherlands (154 per 1000), Finland (133 per 1000), and Scotland (126 per 1000), with 22% of countries indicating less than 20 kidney transplants per 1000 dialysis patients (Figure 13.16b).

Introduction

This chapter examines international trends in treatment of end-stage renal disease (ESRD). The number of countries and regions represented in this

year's Annual Data Report has increased to 60 from 57 in last year's ADR, with the addition of Morocco, Montenegro, and Sri Lanka.

This work is made possible through the substantial efforts of many individuals from all participating

countries in collecting and contributing data for this international collaboration. We sincerely thank all of the registries and providers for their efforts, and have included a list of participants at the end of this chapter to further acknowledge their contributions. The information we provide is intended to serve as a resource for the worldwide ESRD community, to inform health care policies, patient care, and application of resources, while stimulating meaningful research for improving ESRD patient care.

The comparisons we present are intended to increase awareness of the international trends, similarities, and differences in key ESRD treatment measures. Data collection methods vary considerably across countries, therefore direct comparisons should be made with caution. Data reflect “treated ESRD”. The degree of unrecognized diagnosis of ESRD or reduced access to renal replacement therapy (RRT) varies across countries. In countries where the latter are more common, reported ESRD incidence may substantially underestimate the true incidence of irreversible kidney failure. Furthermore, in some countries where RRT is widely available, true ESRD incidence may be underestimated because some patients decline dialysis or transplantation. The term “conservative kidney management” has been used to describe patients who choose to forego or postpone RRT while continuing active medical care by nephrologists and other providers (Robinson et al, 2016).

We welcome any suggestions to further improve the content of this chapter for the benefit of the international community, and invite all renal registries to participate in this data collection and collaboration in the future. There are many countries not yet represented, therefore efforts to increase international engagement and enhance this chapter’s content will continue to be a focus of our work.

Methods

The findings presented in this chapter are drawn from each country’s response to the USRDS request for information on patients receiving renal

replacement therapy, as recorded on our *international data-collection form* provided to participants.

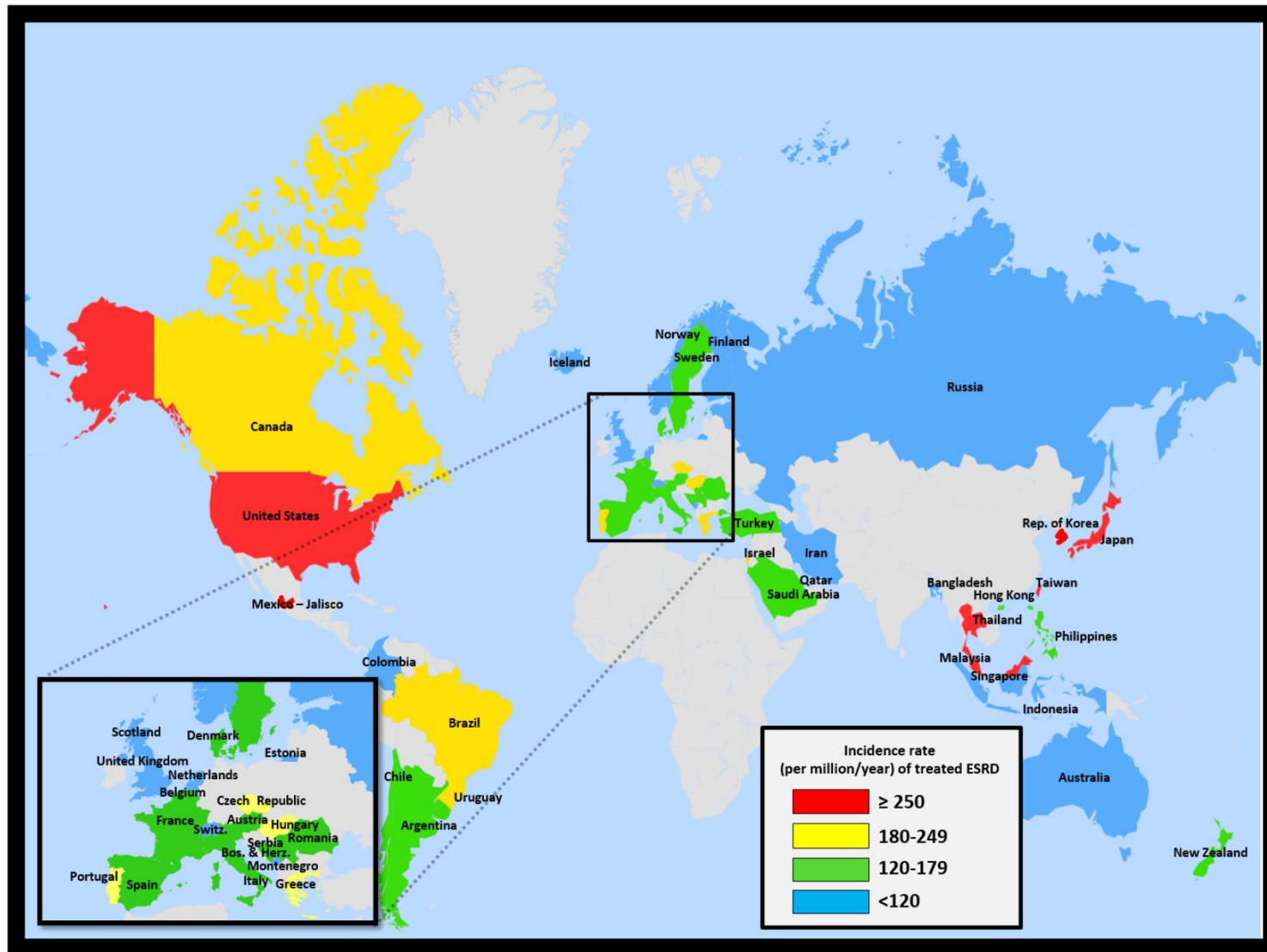
Data tables formerly presented in the content of this chapter are now located in *Reference Table N*. Please also see the ESRD Analytical Methods chapter in the ESRD volume for an explanation of analytical methods used to generate the figures in this chapter.

Incidence of Treated ESRD

In 2014, reported incidence rates of treated ESRD varied greatly across countries (see Figures 13.1 and 13.2). Taiwan, the Jalisco region of Mexico, and the U.S. reported the highest incidence of treated ESRD, at 455, 421, and 370 individuals per million general population (PMP), respectively. The next highest rates, ranging from 203–299 PMP, were reported for Thailand, Singapore, Japan, the Republic of Korea, Malaysia, Portugal, Hungary, Greece, and Israel. The lowest treated ESRD incidence rates, ranging from 49 to 97 PMP, were reported by Bangladesh, Russia, Iceland, Iran, Finland, Estonia, Colombia, Montenegro, and Switzerland.

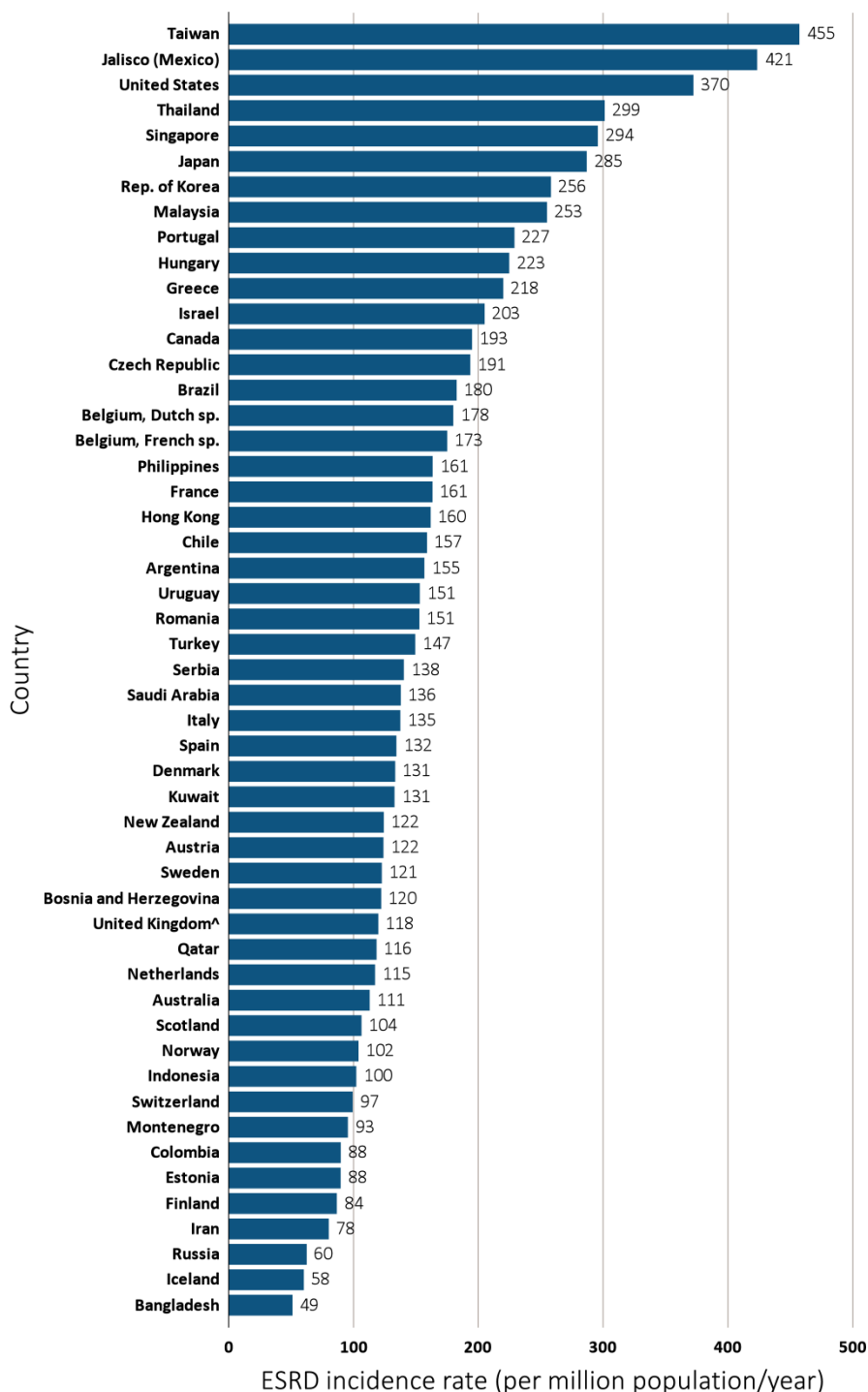
Trends in the incidence of treated ESRD also varied greatly across countries, as shown in Figure 13.3. In addition, we evaluated the percent change in averaged ESRD incidence rates in 2013/14 versus that in 2001/02 (Reference Table N.1). The greatest increases in the incidence of treated ESRD were reported for Thailand (1009%), Bangladesh (643%), Russia (291%), the Philippines (190%), Malaysia (162%), the Republic of Korea (101%), and the Jalisco region of Mexico (93%). In contrast, the averaged ESRD incidence in 2013/14 was 3–14% lower than that in 2001/02 in Austria, Denmark, Iceland, Finland, Sweden, and Scotland. The incidence of treated ESRD was relatively stable in nearly half of all countries, displaying an overall increase of 2% to 30% when comparing the rate in 2013/14 to that of 2001/02. The U.S. displayed one of the more stable ESRD incidence rates over this time period, with an overall 9% increase from 2001/02 to that in 2013/14. Most of this change occurred prior to 2006, with little change in U.S. ESRD incidence rates since 2006.

vol 2 Figure 13.1 Geographic variations in the incidence rate of treated ESRD (per million population/year), by country, 2014



Data source: Special analyses, USRDS ESRD Database. Data presented only for countries from which relevant information was available. All rates are unadjusted. ^United Kingdom: England, Wales, Northern Ireland (Scotland data reported separately). Data for Italy include 6 regions. Data for Indonesia represent the West Java region. Data for France include 22 regions. Data for Spain include 18 of 19 regions. Data for Canada excludes Quebec. Japan includes dialysis patients only. Abbreviation: ESRD, end-stage renal disease.

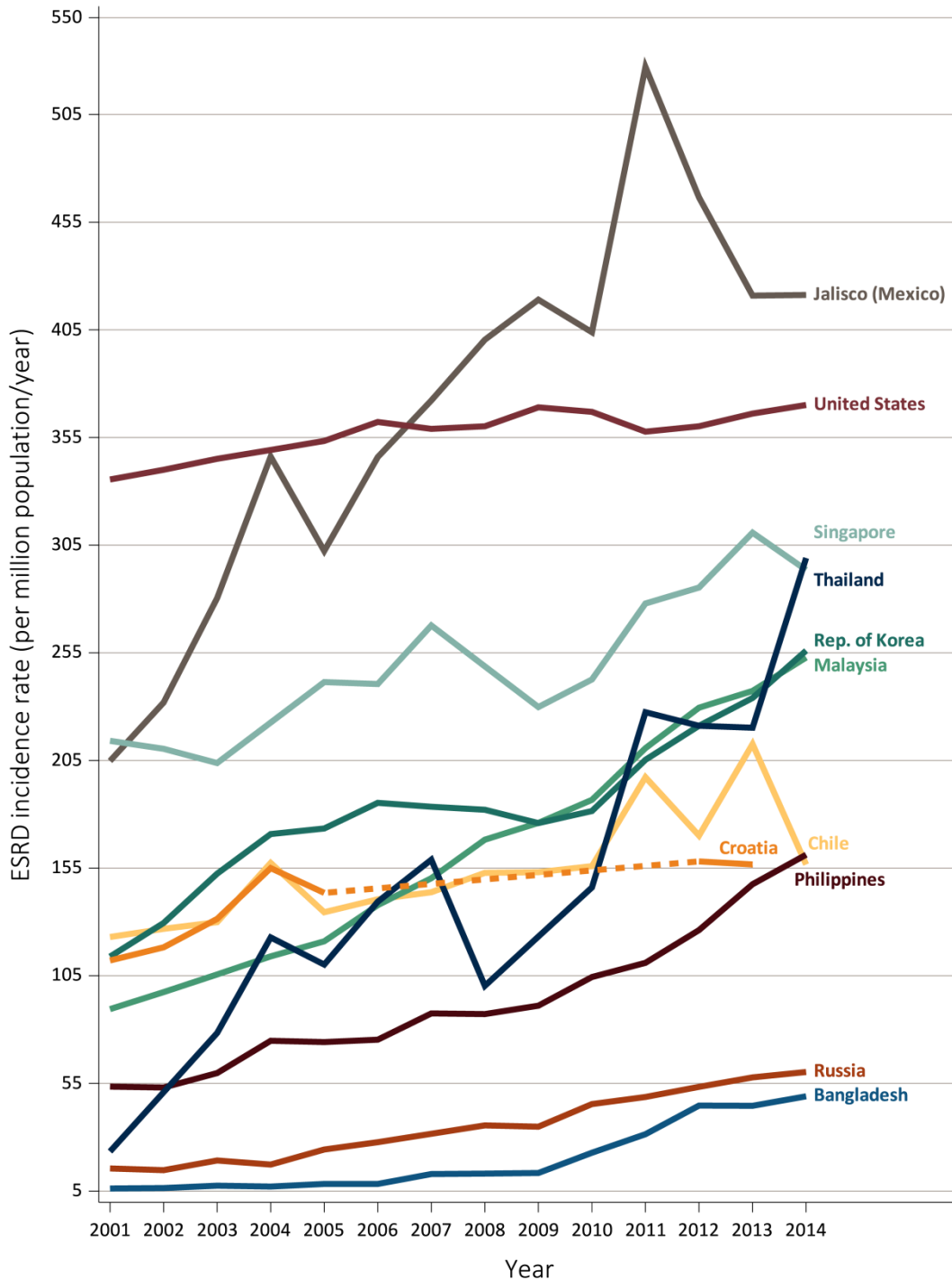
vol 2 Figure 13.2 Incidence rate of treated ESRD (per million population/year), by country, 2014



Data source: Special analyses, USRDS ESRD Database. Data presented only for countries from which relevant information was available. All rates are unadjusted. ^United Kingdom: England, Wales, Northern Ireland (Scotland data reported separately). Data for Italy include 6 regions. Data for Indonesia represent the West Java region. Data for France include 22 regions. Data for Spain include 18 of 19 regions. Data for Canada excludes Quebec. Japan includes dialysis patients only. Abbreviations: ESRD, end-stage renal disease; sp., speaking.

vol 2 Figure 13.3 Trends in the incidence rate of treated ESRD (per million population/year), by country, 2001-2014

a) Ten countries having the highest % rise in ESRD incidence rate in 2001/02 versus that in 2013/14, plus the U.S.

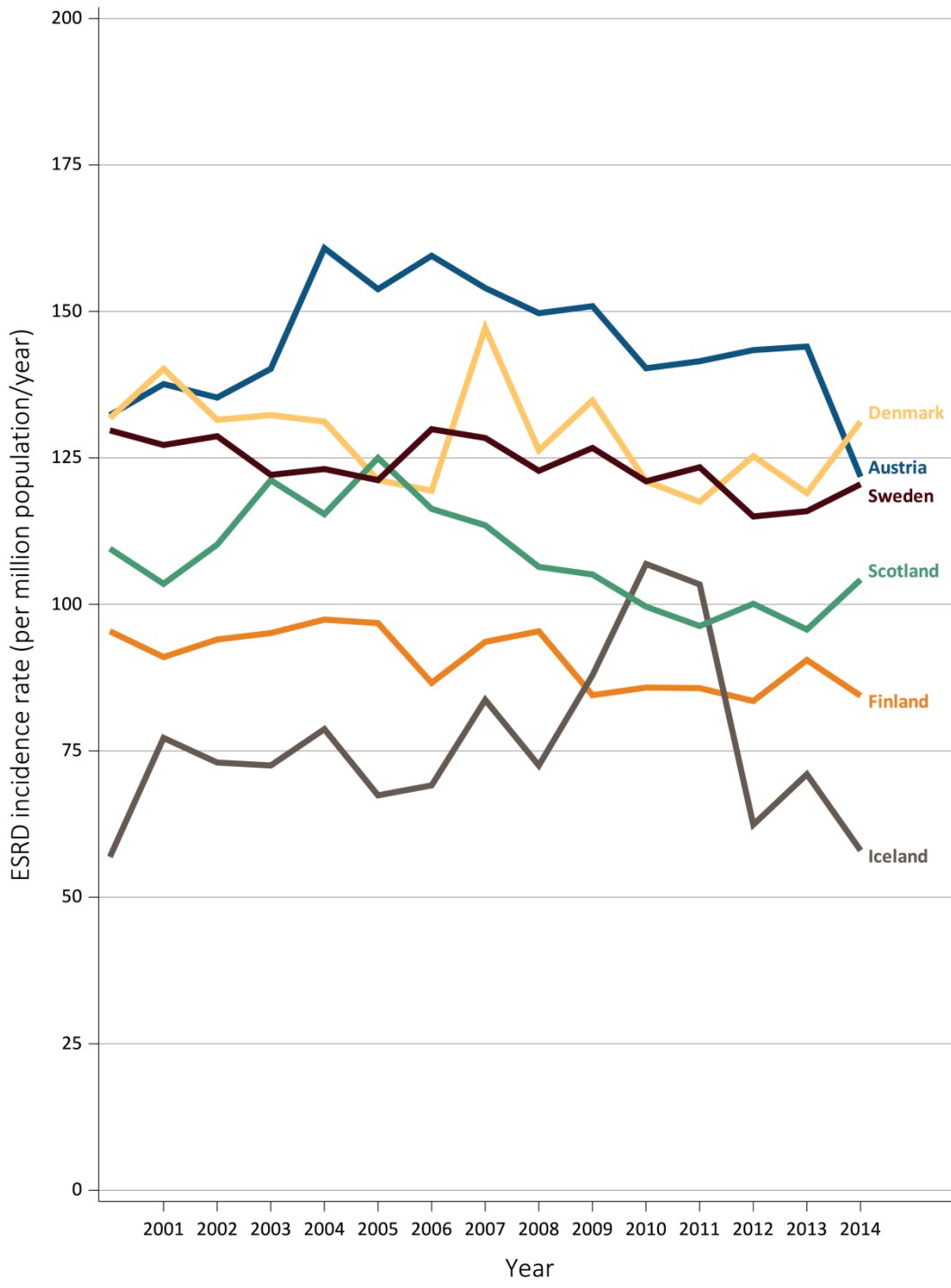


Data source: Special analyses, USRDS ESRD Database. All rates are unadjusted. Data for Croatia are missing from 2006-2011, 2014, indicated by the dashed line. Data for U.S. are shown for comparison purposes. Abbreviation: ESRD, end-stage renal disease.

Figure 13.3 continued on next page.

vol 2 Figure 13.3 Trends in the incidence rate of treated ESRD (per million population/year), by country, 2001-2014 (continued)

b) Six countries having the largest % decline in ESRD incidence rate: 2013/14 versus that in 2001/02



Data source: Special analyses, USRDS ESRD Database. All rates are unadjusted. Only six countries had a decrease in incidence from 2001/02-2013/14. Abbreviation: ESRD, end-stage renal disease.

DIABETES AS PRIMARY CAUSE OF END-STAGE RENAL DISEASE IN INCIDENT PATIENTS

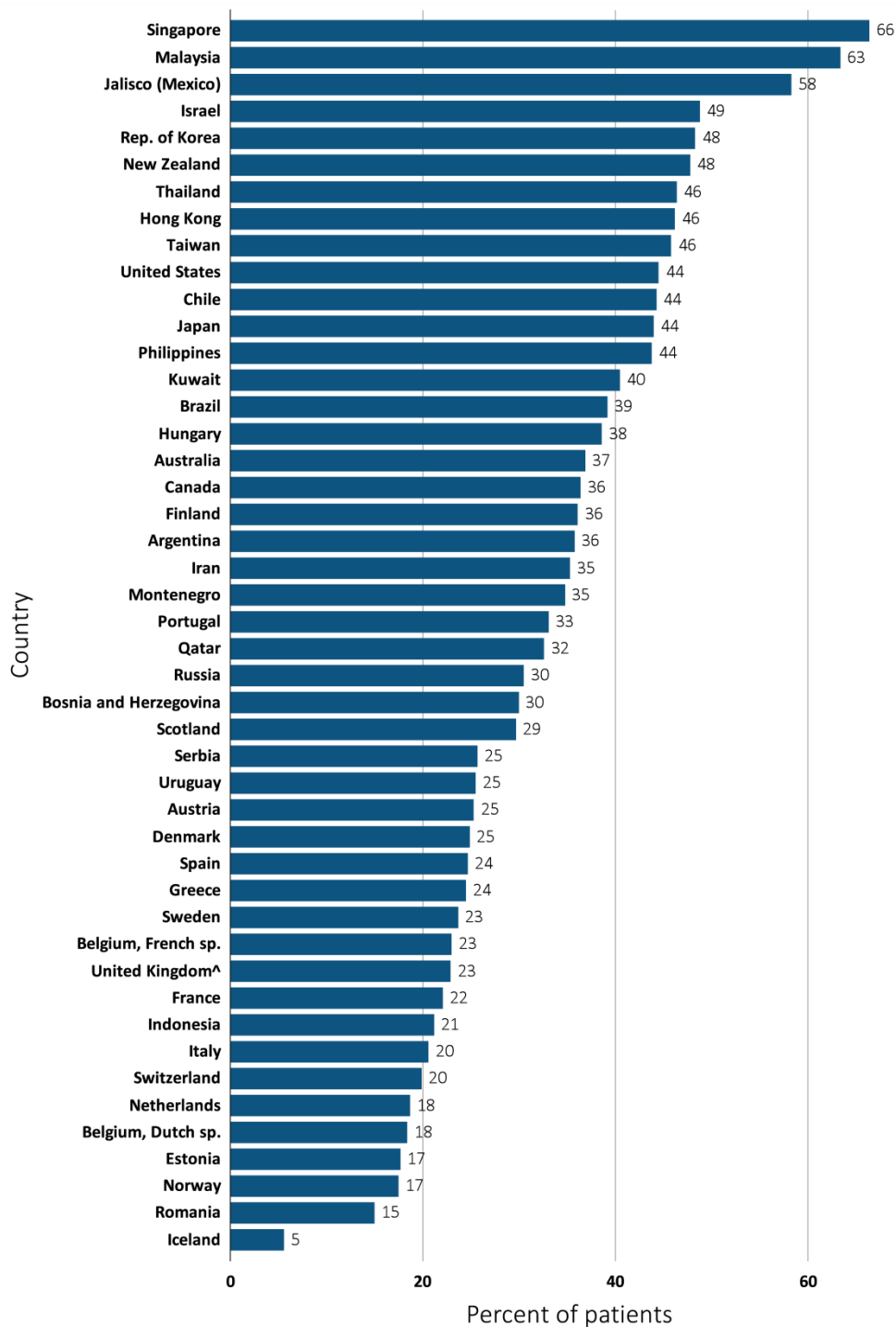
Data on the incidence of treated ESRD with a primary cause of diabetes mellitus (DM)—a key contributor to the global burden of ESRD—were provided by nearly 72% of the countries participating in this report. In 2014, Singapore, Malaysia, and the Jalisco region of Mexico reported the highest proportions of patients with new ESRD due to DM, at 66%, 63%, and 58% (Figure 13.4). Furthermore, DM was the primary cause of new ESRD for at least 40% of patients in Israel, the Republic of Korea, New Zealand, Thailand, Hong Kong, Taiwan, U.S., Chile, Japan, the Philippines, and Kuwait. In contrast, in 2014, DM was the primary cause of ESRD for less than 20% of new ESRD patients in Italy, Switzerland, the Netherlands, Belgium (Dutch-speaking), Estonia, Norway, Romania, and Iceland.

Twenty-three countries have provided rates of ESRD due to DM for the entire time period from 2001 to 2014. These data indicate an overall rise in the rate of treated ESRD due to DM in most, but not all areas (Reference Table N.2). In some countries this increase has been especially large (Figure 13.5), such as in Thailand, Russia, the Philippines, Malaysia, the Republic of Korea, and the Jalisco region of Mexico. In these countries, the rates of treated ESRD incidence due to DM have more than doubled between 2001 and 2014. Among the countries shown, the Jalisco region of Mexico had the highest rate in 2014, at nearly 244 new ESRD patients PMP having diabetes as primary ESRD cause. It is conceivable that determination of

primary ESRD cause may have altered in some countries over this reporting period, and thus have potentially contributed to observed changes in the percentage of incident patients with DM as cause of ESRD. However, we currently have no information regarding the extent of this possibility for any of the countries.

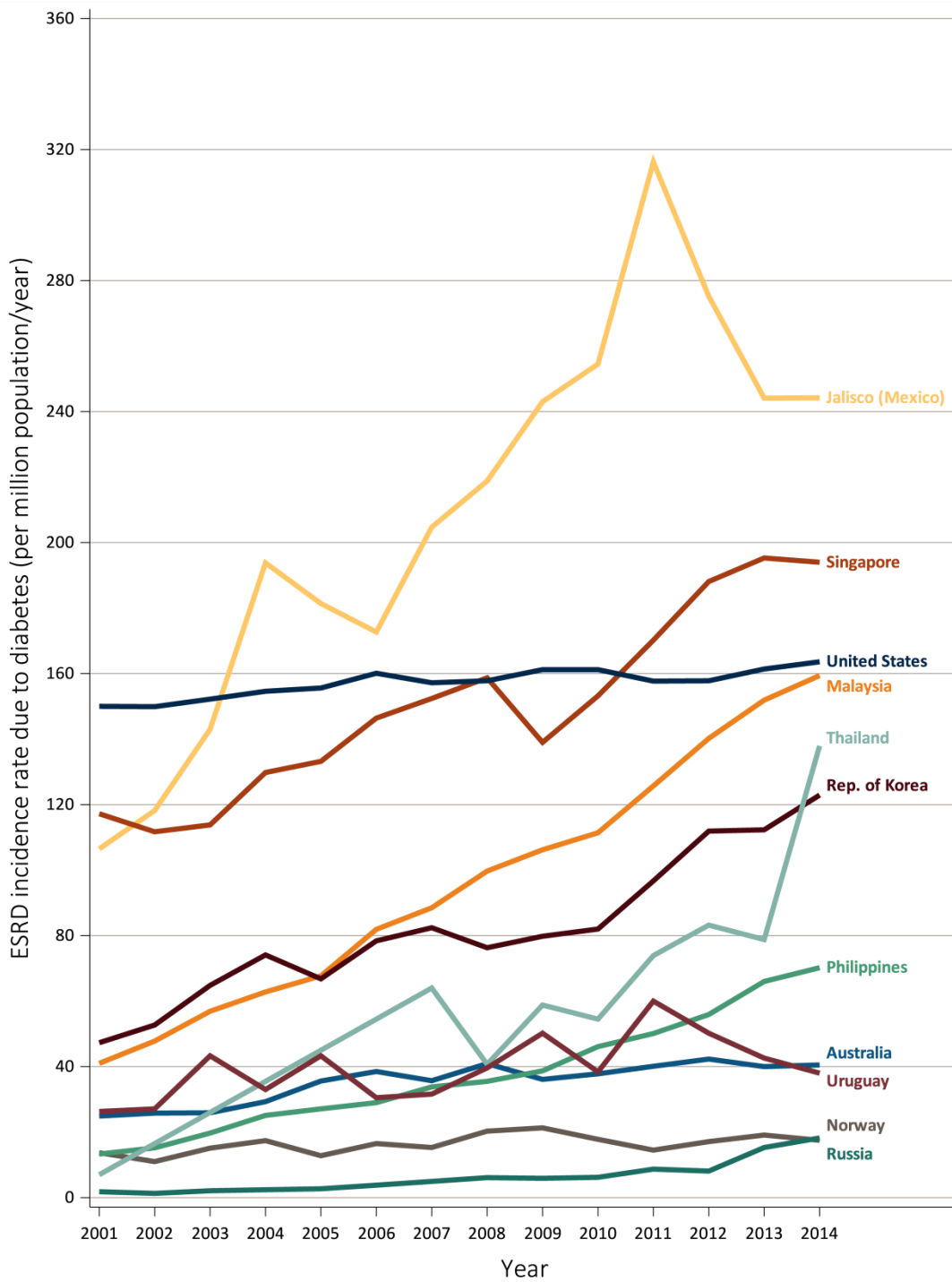
The relationship of percent change in overall treated ESRD incidence with change in treated incidence due to DM is shown in Figure 13.6. Data represent 27 countries across three international regions, from 2001-2014. In each international region, although not in all countries, a positive relationship is seen between the percent change in treated ESRD incidence and percent change in treated ESRD incidence due to DM. Overall, the largest increases in treated ESRD incidence due to DM were seen in the region consisting of Asia and Russia, and were associated with the largest rises in overall ESRD incidence from 2001-2014. In contrast, six countries showed a decline in ESRD due to DM from 2001-2014, with five of these countries also showing declines in overall treated ESRD incidence (Austria, Iceland, Finland, Denmark, Sweden, and the Dutch-speaking region of Belgium). It is noteworthy that this relationship differs considerably across countries, whereby in some the percent change in treated ESRD incidence is of similar magnitude to the percent change in treated ESRD incidence due to DM, while in others this positive relationship is of a much lower equivalence. Thus, the contribution of treated ESRD incidence due to DM to the overall treated ESRD incidence varies substantially.

vol 2 Figure 13.4 Percentage of incident ESRD patients with diabetes as the primary cause of ESRD, by country, 2014



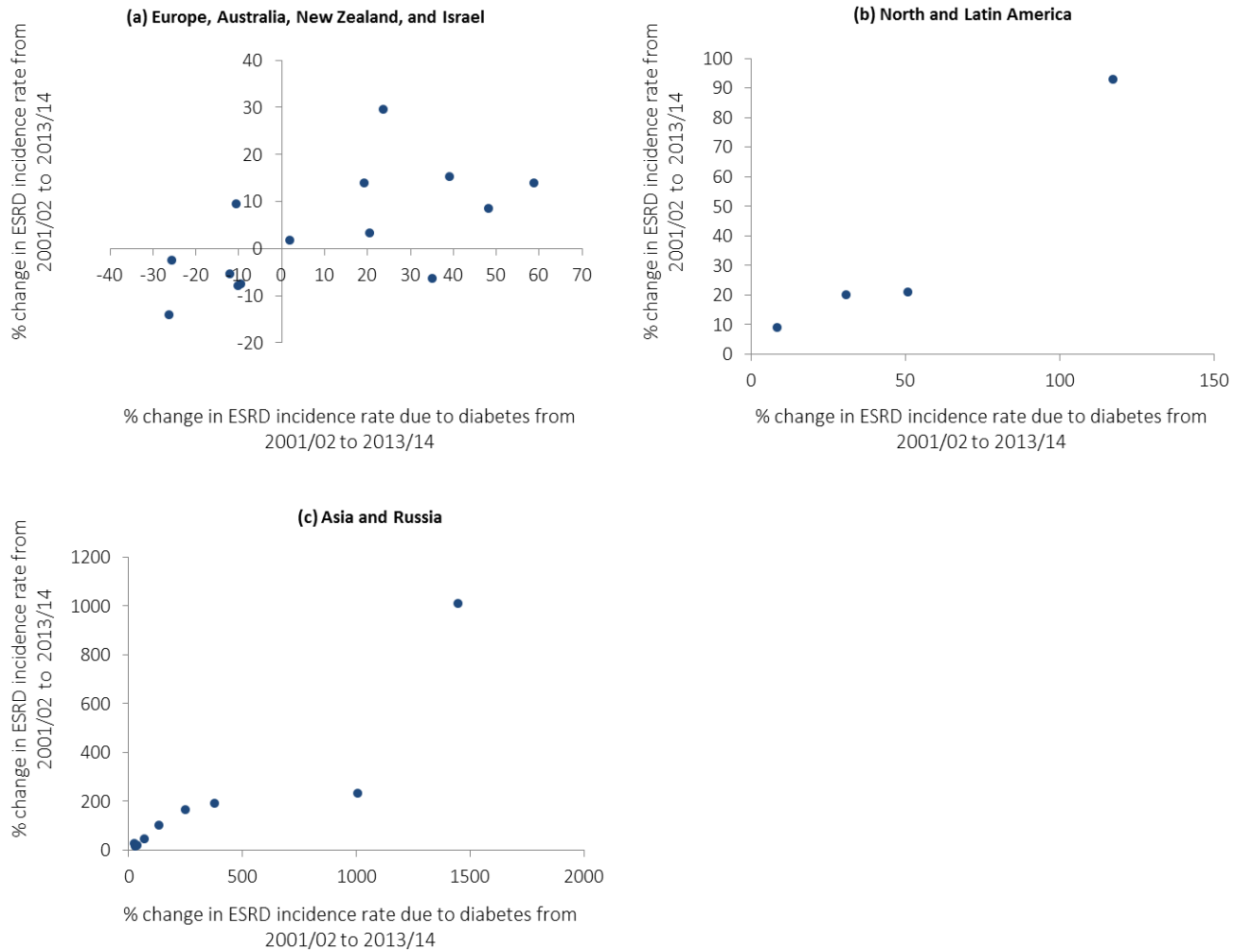
Data source: Special analyses, USRDS ESRD Database. Data presented only for countries from which relevant information was available. ^United Kingdom: England, Wales, Northern Ireland (Scotland data reported separately). Data for Spain include 18 of 19 regions. Data for France include 22 regions. Data for Indonesia represent the West Java region. Data for Italy includes 6 regions. Data for Canada excludes Quebec. Abbreviations: ESRD, end-stage renal disease; sp., speaking.

vol 2 Figure 13.5 Trends in the incidence rate of treated ESRD due to diabetes (per million population/year), by country, 2001-2014



Data source: Special analyses, USRDS ESRD Database. Ten countries having the highest % rise in 2013/14 versus that in 2001/02, plus the U.S. Data presented only for countries from which relevant information was available. Abbreviation: ESRD, end-stage renal disease.

vol 2 Figure 13.6 Country correlation of the percent change in ESRD incidence with the percent change in ESRD incidence due to diabetes, by region, 2001-2014



Data source: Special analyses, USRDS ESRD Database. Data presented only for countries from which relevant information was available. United Kingdom: England, Wales, Northern Ireland (Scotland data reported separately). Countries listed in order of lowest to highest % change in ESRD incidence due to diabetes in each panel (a) Europe and Israel: (< 3%) Iceland, Austria, Finland, Belgium (Dutch-speaking), Denmark, Sweden, Belgium (French-speaking), (> 20%) the Netherlands, New Zealand, Greece, Scotland, Israel, Norway, Australia; (b) North and Latin America: United States, Canada, Uruguay, Jalisco (Mexico); (c) Asia and Russia: (27%-135%) Hong Kong, Japan, Taiwan, Singapore, Rep. of Korea, (>251%) Malaysia, Philippines, Russia, and Thailand. Abbreviation: ESRD, end-stage renal disease.

INCIDENCE OF TREATED END-STAGE RENAL DISEASE BY AGE GROUP AND SEX

The incidence of treated ESRD in 2014 is shown by age group in Figure 13.7. In the majority of countries, treated ESRD incidence was highest among patients aged 75 years or older. The highest rates in this age group were reported for Taiwan, with 2784 PMP/year. This was twice the next highest rate as reported for the U.S., at 1381 PMP/year, followed by Israel and Singapore, at 1276 and 1137 PMP/year. However, the oldest cohort did not display the highest incidence in all countries. In Hong Kong, Malaysia, New Zealand, Serbia, Romania, and Russia the incidence of treated ESRD was 20-50% lower in the population aged 75 years or older, as compared to those aged 65-74 years. The highest rate in younger adults (aged 20-44 years) was reported in the U.S. (135 PMP/year) and in Malaysia (107 PMP/year), where 2014 rates were more than twice that of most other countries with available data.

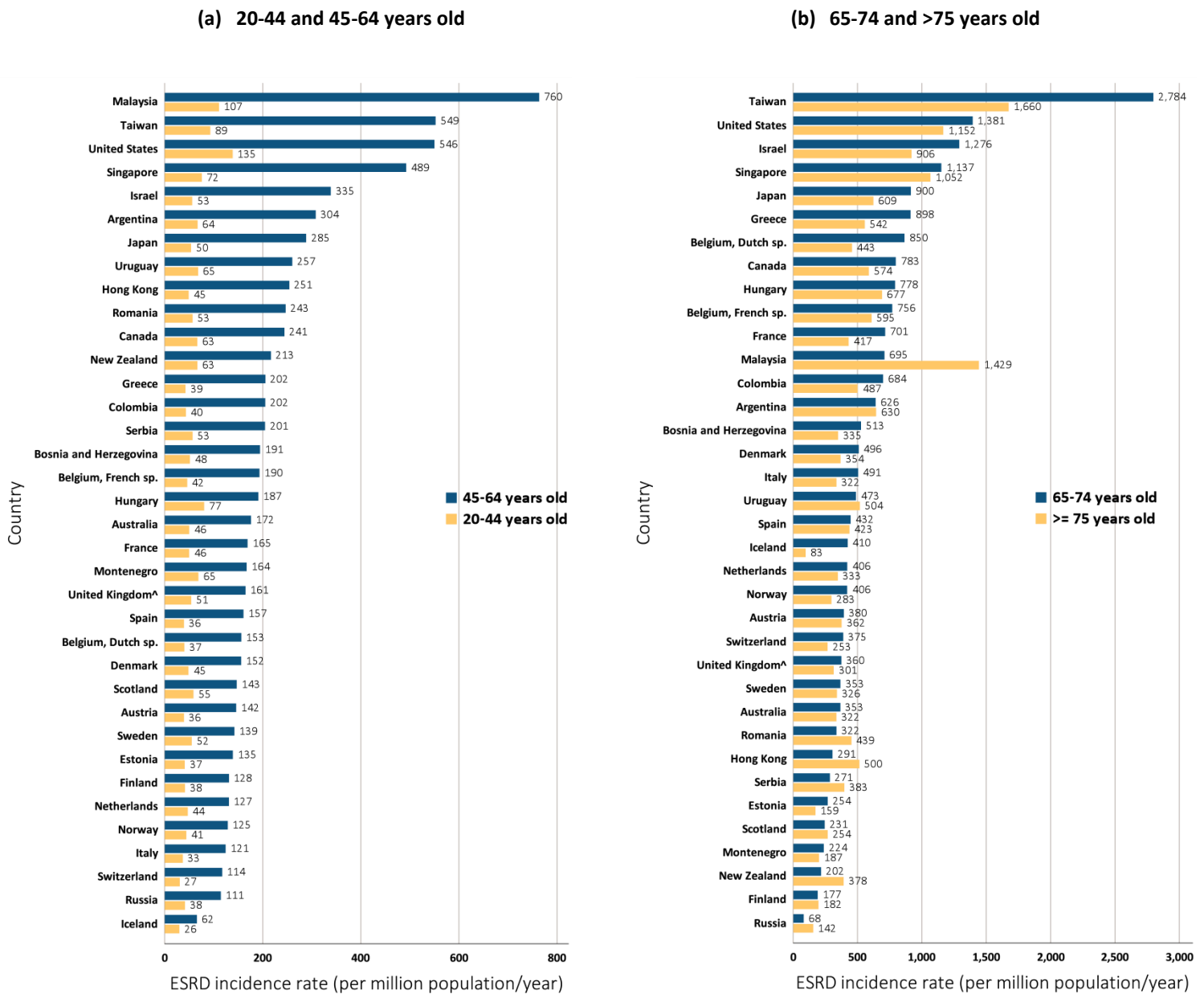
Trends in the incidence of treated ESRD by age group are provided in Reference Table N.3, as the percent change for years 2013/14 versus 2005/06 in the 29 countries for which these data have been contributed. It is noteworthy that both in the U.S. and in nearly half of the 29 countries, an overall decline in the treated ESRD incidence rate was seen among persons

aged 75 years or older, and in 22 of the 29 countries a corresponding decline was seen in the 65-74 age group. These latter trends are especially meaningful, since in many countries nearly half of all new ESRD patients are 65 years or older.

Comparisons of the incidence of treated ESRD by sex are shown in Figure 13.8. In every country the rate is substantially higher for males than for females. ESRD incidence was at least two times higher for males in Austria, Uruguay, Spain, Iceland, French-speaking Belgium, Japan, Norway, Finland, and Montenegro, and was 1.2 to 1.9 times higher for males in most other countries.

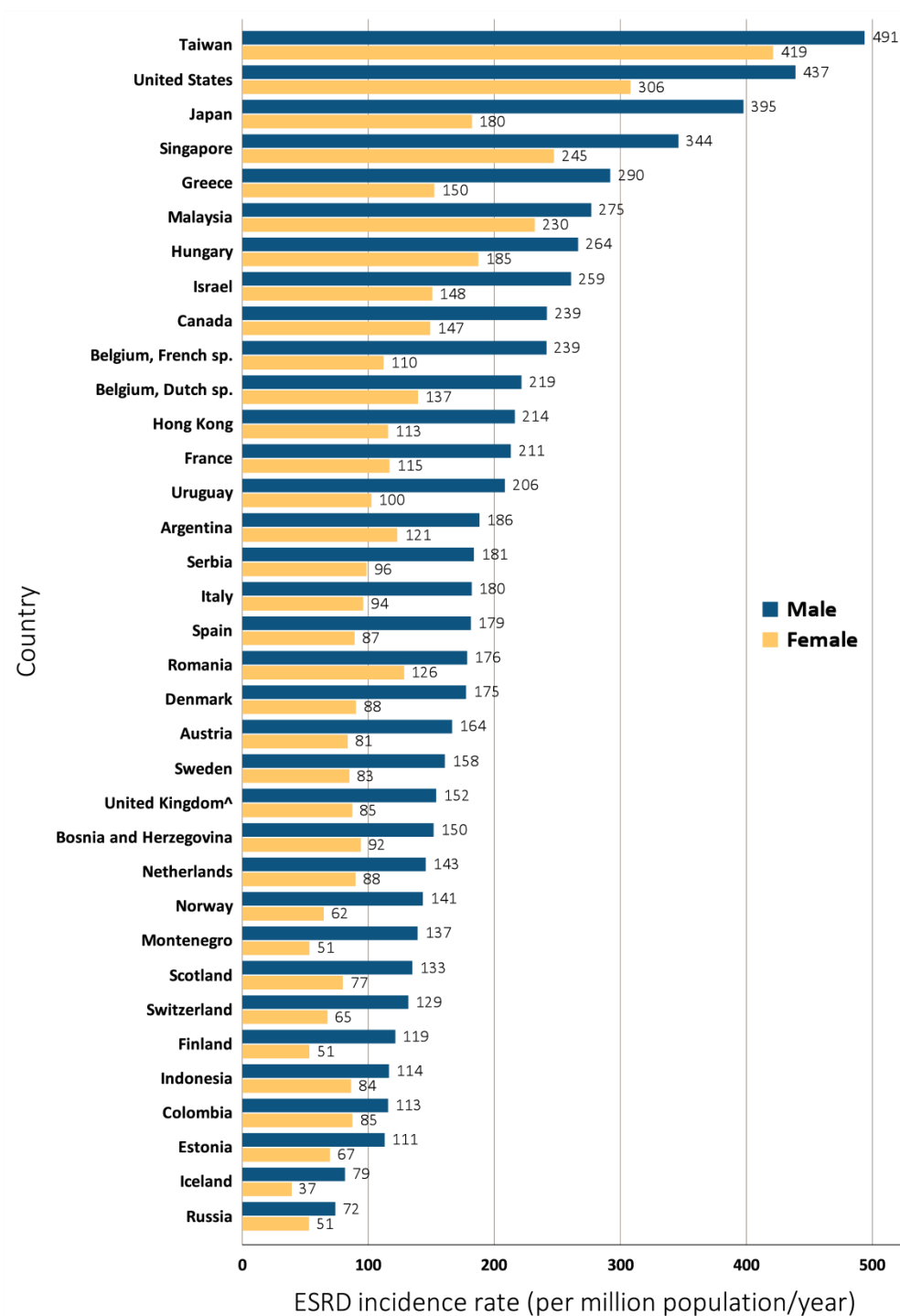
The considerably lower ESRD incidence for females in nearly all countries shown in Figure 13.8 is consistent with the recent paper by Hecking et al (2014), who observed considerably fewer women than men being treated with hemodialysis for ESRD in 12 of the countries participating in the Dialysis Outcomes and Practice Patterns Study (DOPPS) from 2002-2012. In conjunction with the prior findings by Hecking et al (2014), the sex differences in incidence rates from all countries shown in this report support investigation of the broader question of which factors are responsible for the differential ESRD incidence in males versus females.

vol 2 Figure 13.7 Incidence rate of treated ESRD (per million population/year), by age group and country, 2014



Data source: Special analyses, USRDS ESRD Database. Data presented only for countries from which relevant information was available. ^United Kingdom: England, Wales, Northern Ireland (Scotland data reported separately). Data for Spain include 18 of 19 regions. Data for Italy include 6 regions. Data for France include 22 regions. Data for Canada excludes Quebec. Japan includes dialysis patients only. For graph (a), data for Spain include patients 15-64 years old, and data for the United States include patients 22-64 years old. Abbreviations: ESRD, end-stage renal disease; sp., speaking.

vol 2 Figure 13.8 Incidence rate of treated ESRD (per million population/year), by sex and country, 2014



Data source: Special analyses, USRDS ESRD Database. Data presented only for countries from which relevant information was available. ^United Kingdom: England, Wales, Northern Ireland (Scotland data reported separately). Data for Spain include 18 of 19 regions. Data for France include 22 regions. Data for Indonesia represent the West Java region. Data for Italy represent 6 regions. Data for Canada excludes Quebec. Japan includes dialysis patients only. Abbreviations: ESRD, end-stage renal disease; sp., speaking.

Prevalence of End-stage Renal Disease

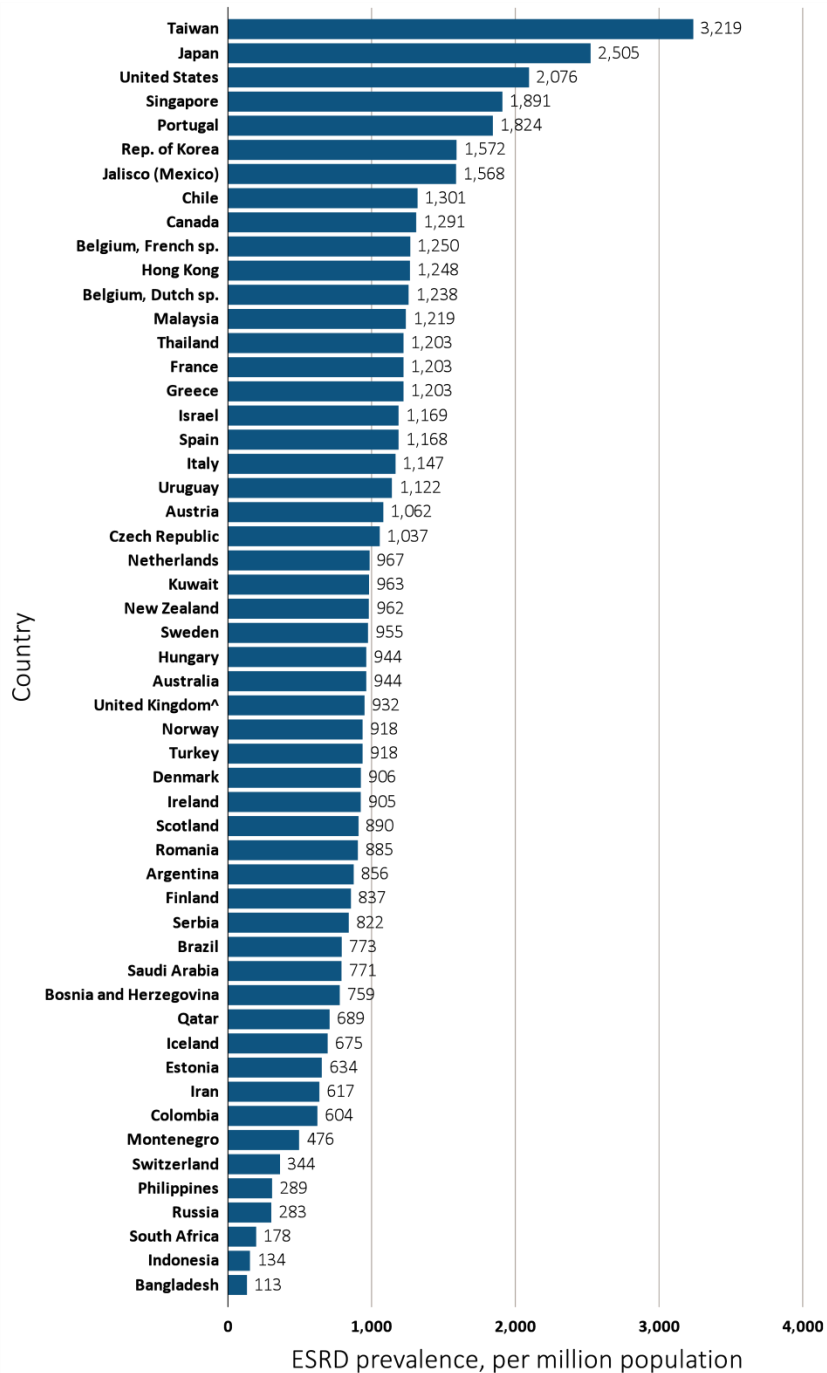
In 2014, a total of 2,217,350 patients were treated for ESRD in all reporting countries. The number was by far the highest in the U.S., with 662,048 treated patients accounting for 30% of the total (Reference Table N.4b), followed by Japan and Brazil with approximate cohorts of 318,000 and 157,000 prevalent ESRD patients. The Republic of Korea, Taiwan, Thailand, Turkey, France, Spain, and the United Kingdom reported between 50,000 to 81,000 treated ESRD patients in 2014, with all other countries indicating smaller populations, with approximately 18,000 treated ESRD patients in the median country.

In 2014, ESRD prevalence varied nearly 30-fold across represented countries (see Figure 13.9 and Reference Table N.4a). Treated ESRD prevalence was highest, ranging from 1568 to 3219 PMP, in the Asian countries of Taiwan, Japan, Singapore, and the Republic of Korea, as well as in the U.S., Portugal, and the Jalisco region of Mexico. In nearly 30% of countries, prevalence ranged from 1,000 to 1,300 PMP, while approximately 40% reported 600 to 1000 prevalent ESRD patients PMP. These included many countries in Western, Central, and Eastern Europe, Australia, and New Zealand, the South American

countries of Argentina, Brazil, and Colombia, and the Middle Eastern nations of Iran, Qatar, and Saudi Arabia. The lowest rates were reported in Bangladesh, Indonesia, South Africa, Russia, the Philippines, Switzerland, and Montenegro, where ESRD prevalence ranged from 113 to 476 PMP.

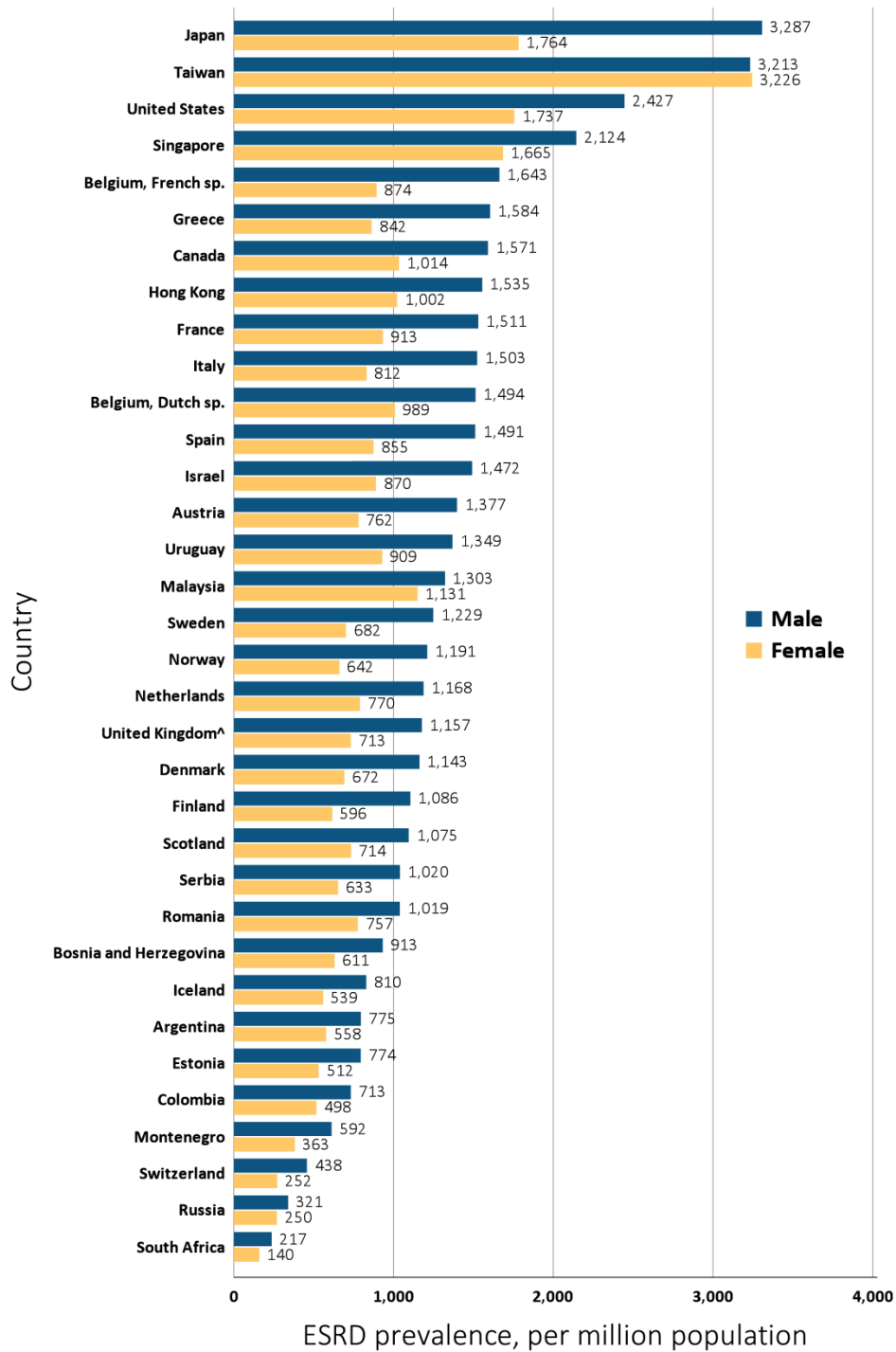
Although ESRD incidence rates have been quite level or decreasing in many countries during recent years, ESRD prevalence PMP has steadily increased in all 32 countries that provided data from 2001 to 2013 and/or 2014 (Reference Table N.4a and Figure 13.11). Over this time period, the median increase in ESRD prevalence was 48%, varying from 18% to 1092% in rise.. These trends are indicative of the increasing worldwide need for additional dialysis and kidney transplantation services to meet the health needs of individuals with ESRD. The largest proportionate increases in ESRD prevalence between 2001/02 and 2013/14 were observed in the Philippines, Thailand, and Jalisco region of Mexico, ranging from 343 to 1092%, followed by rises of 106% to 245% in Israel, Republic of Korea, Malaysia, and Russia. In the U.S., ESRD prevalence increased 43% overall from 2001/02 to 2013/14, with a nearly constant annual increase of 3.2%.

vol 2 Figure 13.9 Prevalence of treated ESRD per million population, by country, 2014



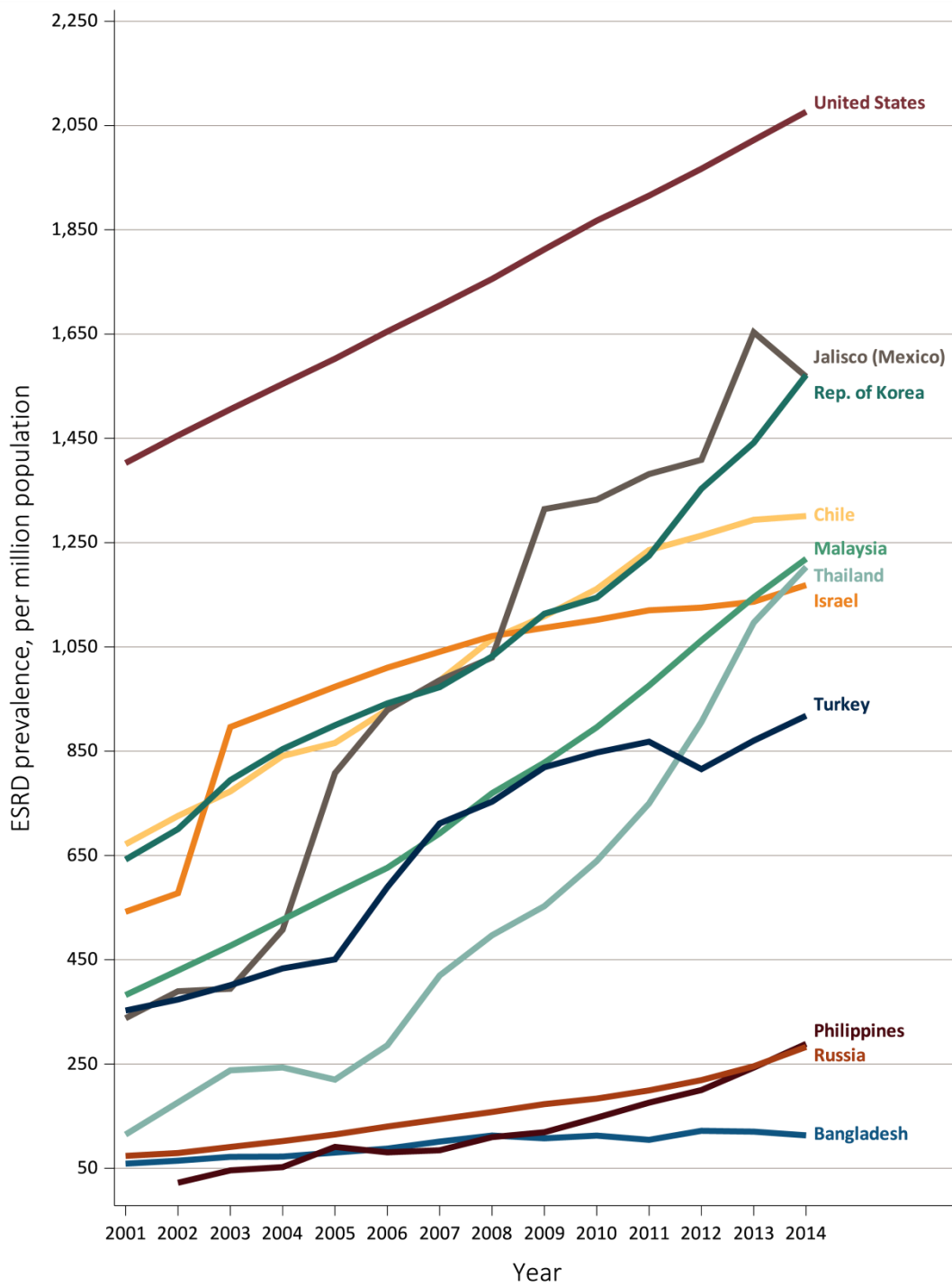
Data source: Special analyses, USRDS ESRD Database. Data presented only for countries from which relevant information was available. ^United Kingdom: England, Wales, Northern Ireland (Scotland data reported separately). The prevalence is unadjusted and reflects prevalence at the end of 2014. Switzerland includes dialysis patients only. Data for Indonesia represent the West Java region. Data for Spain include 18 of 19 regions. Data for France include 22 regions. Data for Italy includes 6 regions. Data for Canada excludes Quebec. Abbreviations: ESRD, end-stage renal disease; sp., speaking.

vol 2 Figure 13.10 Prevalence of treated ESRD per million population, by sex and country, 2014



Data source: Special analyses, USRDS ESRD Database. Data presented only for countries from which relevant information was available. ^United Kingdom: England, Wales, Northern Ireland (Scotland data reported separately). Switzerland includes dialysis patients only. Data for Spain include 18 of 19 regions. Data for France include 22 regions. Data for Italy include 6 regions. Data for Canada excludes Quebec. Abbreviations: ESRD, end-stage renal disease; sp., speaking.

vol 2 Figure 13.11 Trends in the prevalence of treated ESRD per million population, by country, 2001-2014



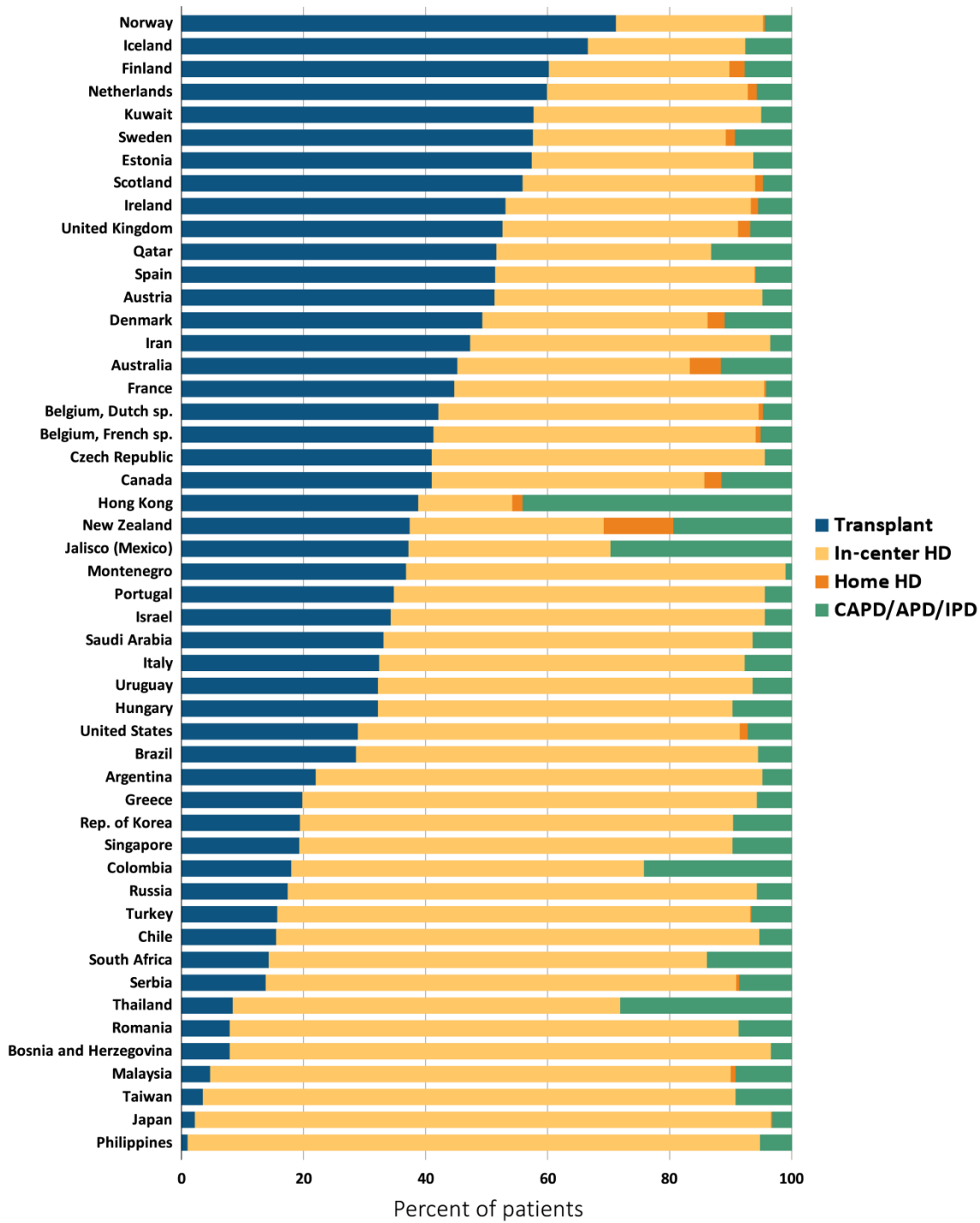
Data source: Special analyses, USRDS ESRD Database. Ten countries having the highest % rise in ESRD prevalence: 2013/14 versus that in 2001/02, plus the U.S. ESRD prevalence is unadjusted. Israel includes dialysis patients only from 2001-2002. U.S. is shown for comparison purposes. Abbreviation: ESRD, end-stage renal disease.

Variations in Use of Different Renal Replacement Therapies for ESRD

In-center hemodialysis, home hemodialysis, peritoneal dialysis, and kidney transplantation serve as the different forms of renal replacement therapy (RRT) for persons with ESRD. As shown in Figure 13.12, the proportionate use of the different RRT forms differs considerably across countries. Dialysis is the most commonly utilized therapeutic approach for treatment of ESRD in the majority of countries, followed by kidney transplantation. Kidney transplantation is the renal replacement therapy (RRT) often viewed by many eligible ESRD patients as their first choice due to substantially higher quality of life and longer median survival as compared with

dialysis therapy. In 2014, transplantation use for patients with ESRD ranged from less than 10% in some Asian and eastern European countries to 50–75% transplant use in the Nordic countries (Denmark, Finland, Iceland, Norway, and Sweden), Estonia, the Netherlands, United Kingdom (including Scotland), Spain, Austria, and Qatar. A striking observation is that the countries with the highest proportion of kidney transplants among ESRD patients also tend to have lower treated ESRD incidence rates of approximately 80 to 130 PMP/year, as shown in Figure 13.2 and Reference Table N.1. Additional information regarding trends in the percent of ESRD patients living with a kidney transplant since 2001 is provided by country in Reference Table N.9.

vol 2 Figure 13.12 Percent distribution of type of renal replacement therapy modality used by ESRD patients, by country, in 2014



Data source: Special analyses, USRDS ESRD Database. Denominator is calculated as the sum of patients receiving HD, PD, Home HD, or treated with a functioning transplant; does not include patients with other/unknown modality. Data for Spain include 18 of 19 regions. Data for France include 22 regions. Data for Italy include 6 regions. Data for Canada excludes Quebec. Abbreviations: CAPD, continuous ambulatory peritoneal dialysis; APD, automated peritoneal dialysis; IPD, intermittent peritoneal dialysis; ESRD, end-stage renal disease; HD, hemodialysis; PD, peritoneal dialysis; sp., speaking

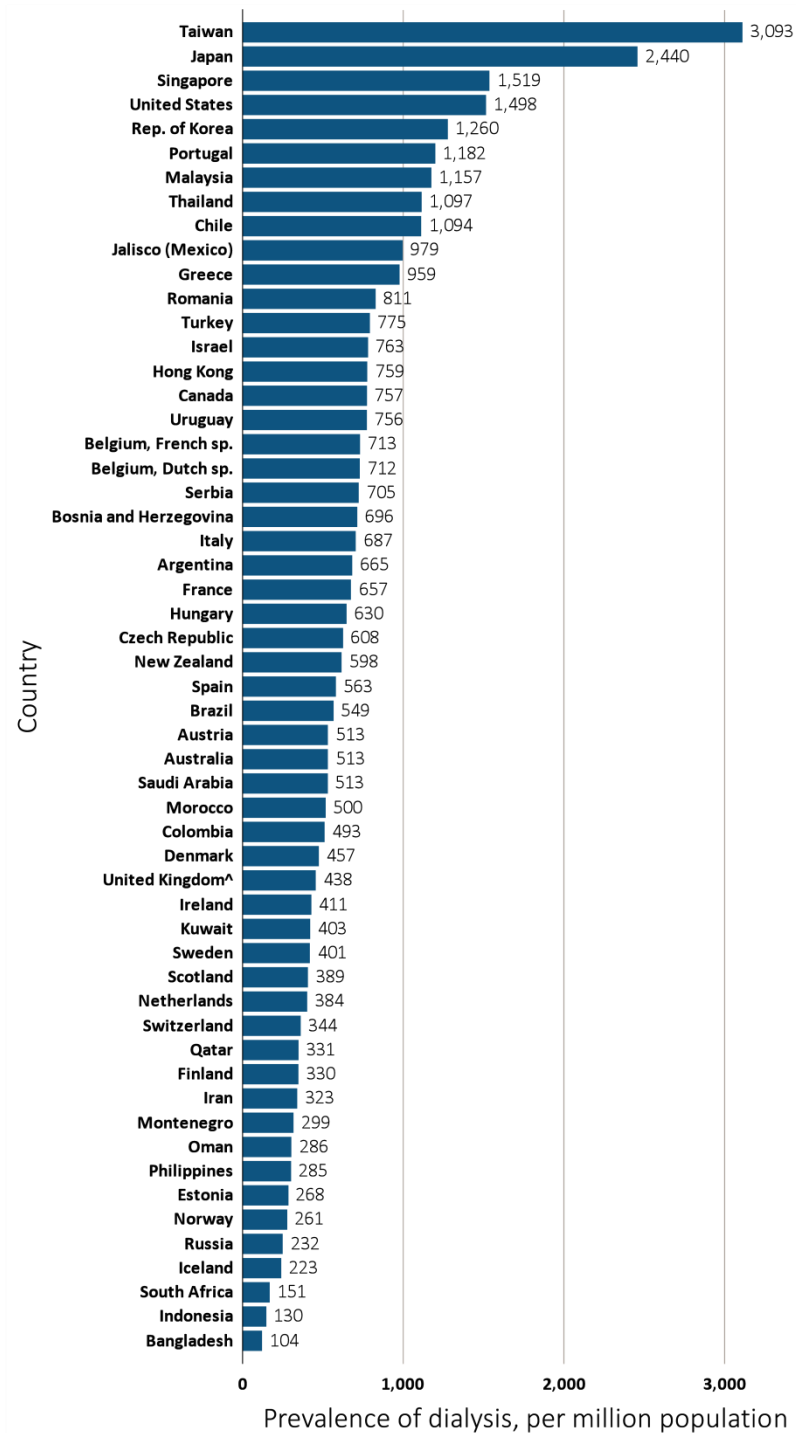
Dialysis Therapy for ESRD

In 2014, the number of ESRD patients receiving dialysis PMP varied nearly 30-fold across countries, from 104 to 151 per million population in Bangladesh, Indonesia, and South Africa to 2440 to 3093 in Japan and Taiwan (Figure 13.13). Some countries have experienced very large rises in the prevalence of dialysis since 2001/02, with an approximately 1200% and 960% increase in the Philippines and Thailand, respectively, and a 180% to 270% rise in Russia, Malaysia, and the Jalisco region of Mexico (Reference Table N.6). Furthermore, the prevalence of dialysis has increased 238% in Romania from 2005 to 2014. However, a plateauing or decline in the prevalence of patients receiving dialysis has been seen in nearly a quarter of all countries during the last five years (Reference Table N.5). These countries include Denmark, Sweden, Iceland, Finland, Norway, the Netherlands, Scotland, Spain, Italy, Austria, Hungary, Oman, and Bangladesh—most of which also tend to have a higher percent use of kidney transplantation, as noted in the prior section.

Hemodialysis (HD) continues to be the most common form of dialysis therapy in nearly all countries (Figure 13.15). In nearly three-fourths of reporting countries, at least 80% of chronic dialysis

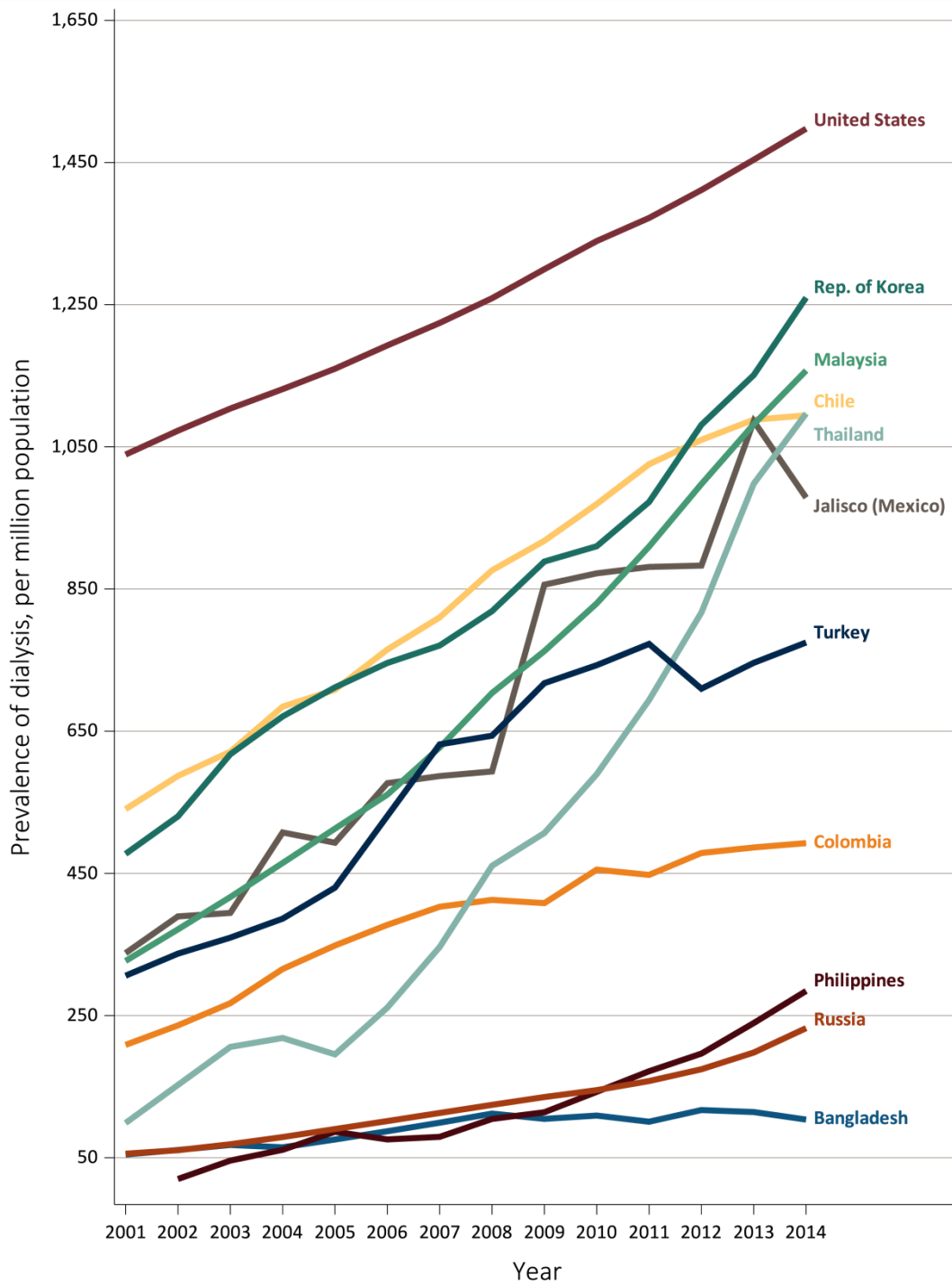
patients were receiving in-center HD in 2014. However, in 2014, PD was used by 72% of dialysis patients in Hong Kong, and 47% in the Jalisco region of Mexico (Figure 13.15, Reference Table N.7b). Furthermore, 29%-31% PD use was reported in Colombia, New Zealand, and Thailand, with 16% to 27% seen in Australia, Canada, Denmark, Finland, Iceland, Qatar, South Africa, and Sweden. Since 2006, an overall trend of increasing PD use as a percentage of all chronic dialysis has been seen in the countries of Argentina, Bangladesh, Chile, Spain, Taiwan, Thailand, the U.S., and Uruguay (Ref. Table N.7b). In contrast, PD use has declined over this same time period in countries such as Belgium, Bosnia and Herzegovina, Colombia, Croatia, Denmark, Finland, France, Greece, Hong Kong, Israel, Jalisco (Mexico), Republic of Korea, the Netherlands, New Zealand, Norway, Romania, Russia, Scotland, Singapore, Turkey, and the United Kingdom. In 2014, home HD therapy was provided to 9.4% and 18.3% of dialysis patients in Australia and New Zealand. Home HD was also used by 3.0 to 6.0% of dialysis patients in Canada, Denmark, Finland, the Netherlands, Sweden, the United Kingdom, and Scotland. However, in all other countries, home HD was either not provided, or was used by fewer than 3% of dialysis patients.

vol 2 Figure 13.13 Prevalence of dialysis per million population, by country, 2014



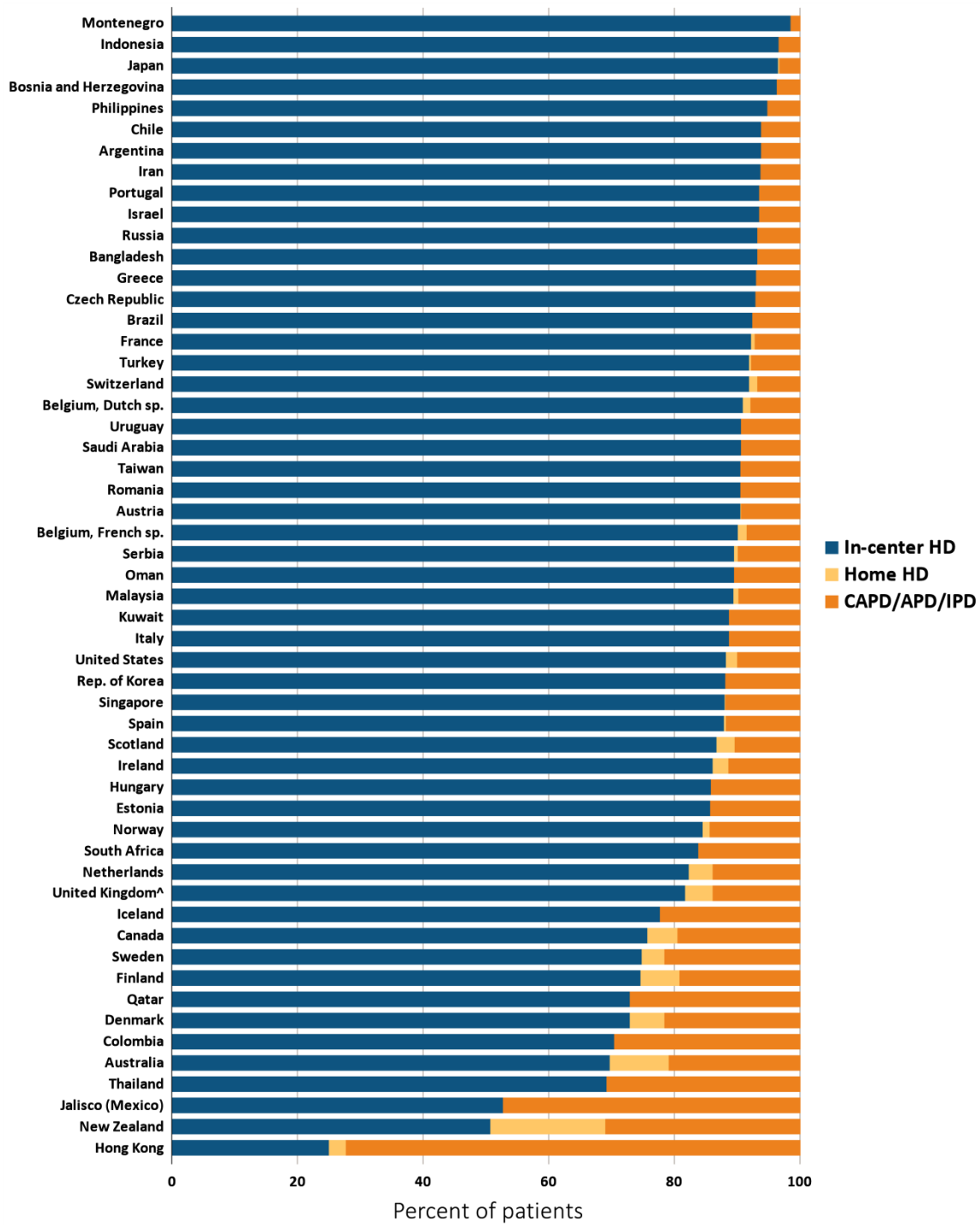
Data source: Special analyses, USRDS ESRD Database. ESRD prevalence is unadjusted and reflects prevalence at the end of 2014. United Kingdom: England, Wales, Northern Ireland (Scotland data reported separately). Data for Indonesia represent the West Java region. Data for Spain include 18 of 19 regions. Data for France include 22 regions. Data for Italy include 6 regions. Data for Canada excludes Quebec. Abbreviation: sp., speaking.

vol 2 Figure 13.14 Trends in the prevalence of dialysis per million population, by country, 2001-2014



Data source: Special analyses, USRDS ESRD Database. Ten countries having the highest % rise in dialysis prevalence: 2013/14 versus that in 2001/02, plus the U.S. The prevalence is unadjusted and reflects prevalence of dialysis at the end of each year. Abbreviation: ESRD, end-stage renal disease.

vol 2 Figure 13.15 Distribution of the percentage of prevalent dialysis patients using in-center HD, home HD, or peritoneal dialysis (CAPD/APD/IPD), 2014



Data source: Special analyses, USRDS ESRD Database. Denominator is calculated as the sum of patients receiving HD, PD, Home HD; does not include patients with other/unknown modality. ^United Kingdom: England, Wales, & Northern Ireland (Scotland data reported separately). Data for Spain include 18 of 19 regions. Data for France include 22 regions. Data for Italy include 6 regions. Data for Canada excludes Quebec. Abbreviations: CAPD, continuous ambulatory peritoneal dialysis; APD, automated peritoneal dialysis; IPD, intermittent peritoneal dialysis.

Kidney Transplantation

Kidney transplantation rates vary greatly across countries, which may reflect not only geographic variations in ESRD incidence and prevalence but also differences in national health care systems, infrastructure for transplantation services, organ availability, degree of genetic homogeneity or heterogeneity within a country's population, and cultural beliefs. Kidney transplantation rates when expressed per million population (PMP) serve to standardize rates according to the size of a country's population and thus, to some extent account for the potential kidney donor pool size (Figure 13.16a). However, it is also of interest to understand transplantation rates in relationship to the size of the population in need. Towards this purpose, we also display kidney transplantation rates per 1000 dialysis patients in a country (Figure 13.16b). Such a comparison indicates that the relative rates by country differ considerably between the two metrics. For example, the U.S. ranks fourth in the world in terms of transplants per million population. However, the U.S. is 33rd in the world in transplants per 1000 dialysis patients (among 49 countries), partially due to the high numbers of U.S. dialysis patients.

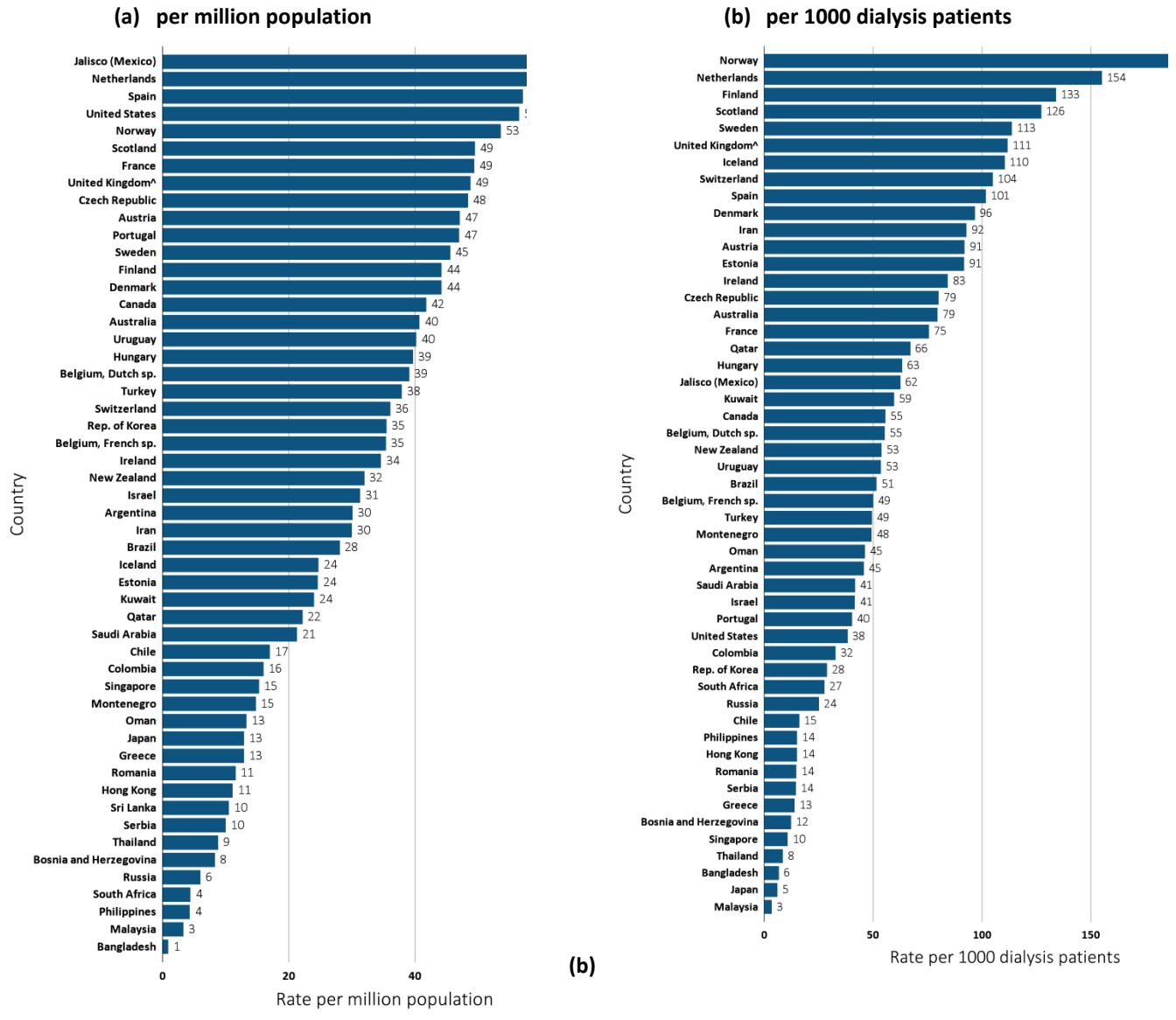
Kidney transplant rates varied greater than 30-fold across countries when expressed PMP, from one to 60 PMP in 2014 (Figure 13.16a). The highest rates were reported in the Jalisco region of Mexico, the Netherlands, Spain, and the U.S., with 56–60 kidney transplants PMP. Transplant rates ranged from 30–53 PMP for 44% percent of countries, 11–28 for 26% of

countries, and 1–10 kidney transplants for the remaining 22%. Countries reporting the lowest rates of kidney transplantation, at 1–4 PMP, included Bangladesh, Malaysia, the Philippines, and South Africa.

Kidney transplant rates as expressed per 1000 dialysis patients also varied greatly across countries, from 3 to 205 in 2014 (Figure 13.16b). The highest rates per 1000 dialysis patients occurred in Norway (205), the Netherlands (154), Finland (133), and Scotland (126). Furthermore, transplant rates of 101 to 113 per 1000 dialysis patients were reported in Sweden, the United Kingdom (excluding Scotland), Iceland, Switzerland, and Spain. One-third of countries reported rates of 50 to 99 per 1000 dialysis patients, 24% had rates of 20–49 per 1000, and the remaining 24% of countries reported rates of less than 20 in 2014. The lowest rates of three to eight transplants per 1000 dialysis patients were reported by the countries of Malaysia, Japan, Bangladesh, and Thailand. During 2104 in the U.S., 38 kidney transplants were performed per 1000 dialysis patients.

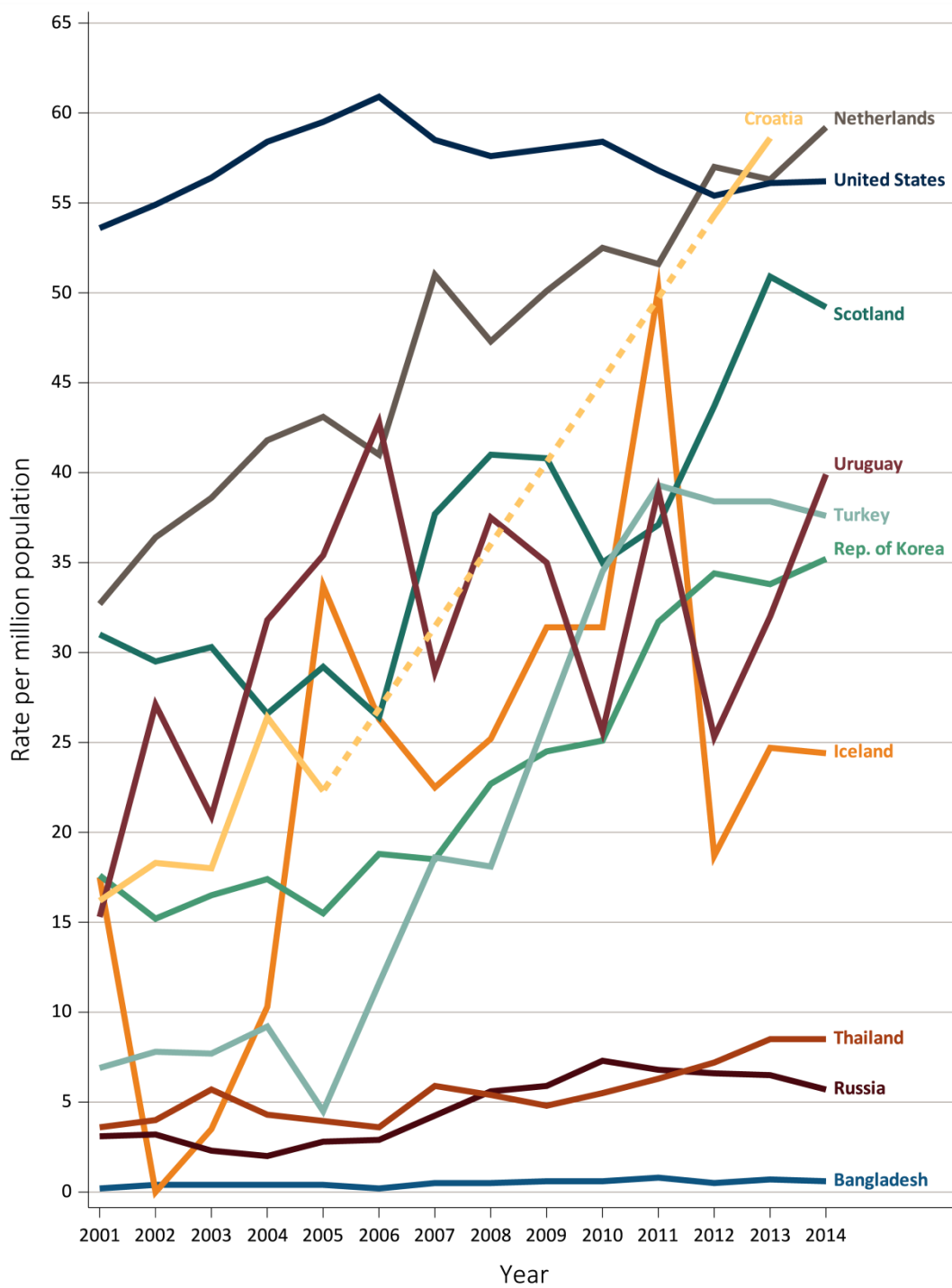
Since 2001, some countries have shown a substantial increase in kidney transplant rates PMP (Ref. Table N.8, Figure 13.17). When comparing transplant rates in 2013/14 to 2001/02, Turkey, Croatia, Iceland, Bangladesh, Thailand, Russia, the Netherlands, the Republic of Korea, Scotland, and Uruguay, have demonstrated the largest increases (62% to 417%). Additionally, kidney transplantation rates PMP were 28–46% higher in the Czech Republic, Israel, Australia, Denmark, and Sweden in 2013/14 versus that in 2001/02 in these countries.

vol 2 Figure 13.16 Kidney transplantation rate, by country, 2014



Data source: Special analyses, USRDS ESRD Database. Data presented only for countries from which relevant information was available. All rates are unadjusted. ^United Kingdom: England, Wales, & Northern Ireland (Scotland data reported separately). Data for France include 22 regions. Data for Sri Lanka is from 7 government hospitals. Data for Spain include all regions. Data for Canada excludes Quebec. Abbreviation: sp., speaking.

vol 2 Figure 13.17 Trends in kidney transplantation rates per million population, by country



Data source: Special analyses, USRDS ESRD Database. Ten countries having the highest % rise in kidney transplantation rate: 2013/14 versus that in 2001/02, plus the U.S. All rates are unadjusted. Data for Croatia are missing from 2006-2011, 2014. Abbreviations: ESRD, end-stage renal disease.

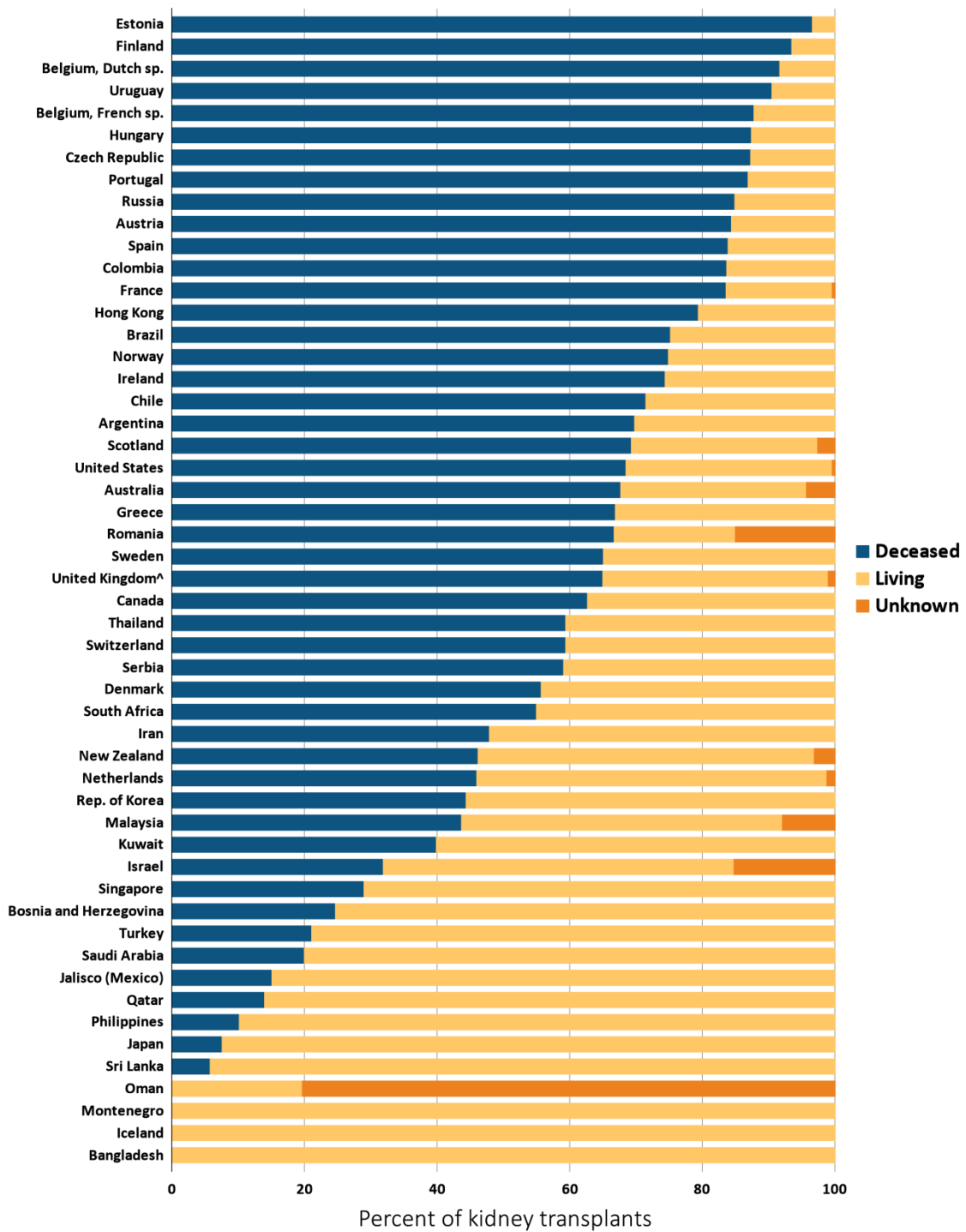
Large international differences also are seen in the types of kidney donors, ranging from 80%-100% living donor kidney transplants in Bangladesh, Montenegro, Sri Lanka, Japan, the Philippines, Qatar, the Jalisco region of Mexico, Saudi Arabia, and Turkey, to only 5% in Estonia (Figure 13.18). In approximately 60% of countries, donation from deceased individuals was the predominant form of kidney donation during 2014.

In 2014, Norway, Portugal, and the U.S. reported the highest prevalence of ESRD patients living with a kidney transplant per million population, at 630 to 657 PMP (Figure 13.19 and Ref. Table N.9). Thirty-five percent of countries indicated 400 to 599 prevalent ESRD patients PMP living with a kidney transplant, while the remaining 56% of countries were nearly evenly divided between having less than 200, or 200-399 PMP. However, as noted earlier in this chapter, countries having a high prevalence of ESRD patients living with a kidney transplant PMP may not necessarily have a high fraction of ESRD patients living with a kidney transplant (e.g., see section on *Variations in Use of Different Renal Replacement Therapies for ESRD*).

In comparisons of data from 2013/14 to 2001/02, the prevalence of ESRD patients living with a kidney transplant PMP has increased in every country with available data, rising from 52% to 372% in approximately one-half of all countries, and by 13%-50% in the remaining nations (Reference Table N.9). The largest increases during this period of 148% to 372% in the prevalence of ESRD patients living with a kidney transplant PMP were seen in Russia, Croatia, Uruguay, Turkey and Thailand.

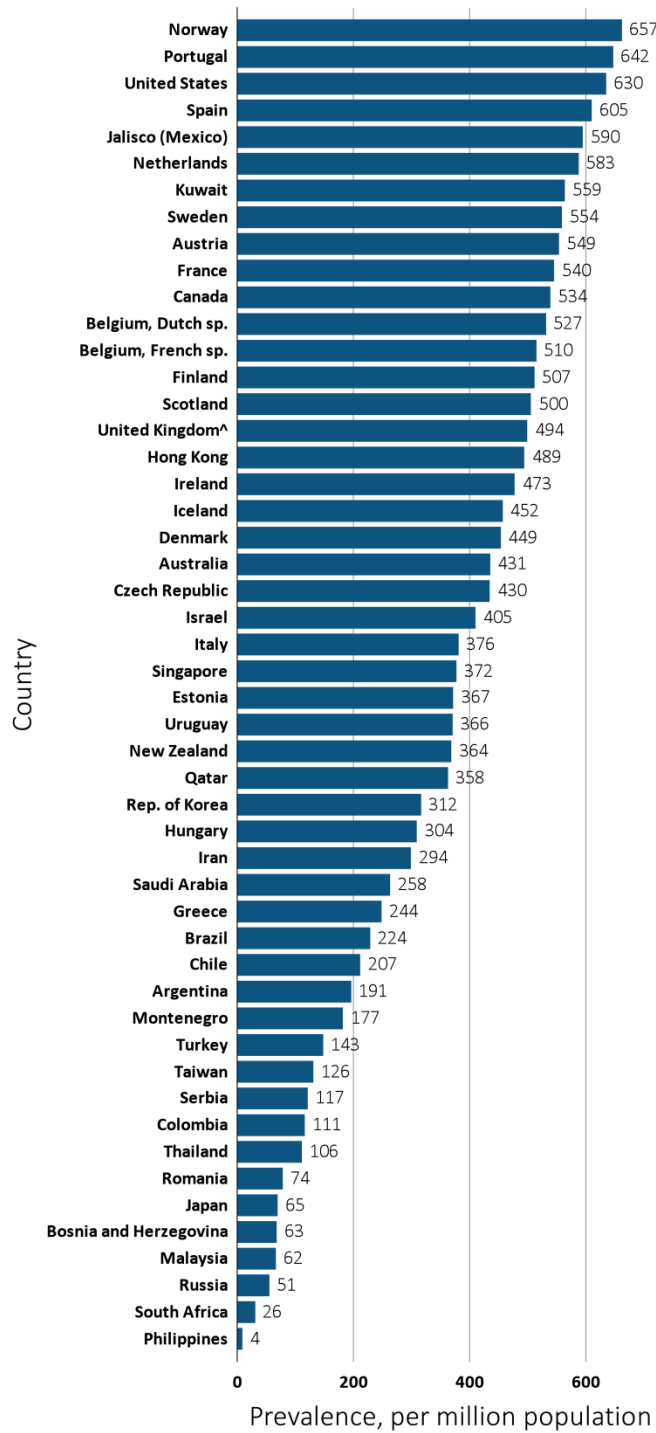
The percentage of all ESRD patients living with a kidney transplant has remained relatively constant in most countries from 2001-2014 (Reference Table N.10). However, some countries have demonstrated a continuing increase, particularly in Denmark, Iceland, the Netherlands, Scotland, Sweden, and the United Kingdom, which have 50%-67% of their ESRD patients living with a kidney transplant. Furthermore, Uruguay and Turkey also have shown notable increases in the percent of ESRD patients living with a kidney transplant. In contrast, Malaysia, Singapore, the Philippines, and Chile have shown a decline.

vol 2 Figure 13.18 Distribution of the percentage of kidney transplantations by kidney donor type and country, 2014



Data source: Special analyses, USRDS ESRD Database. Denominator is calculated as the sum of deceased, living donor, and unknown transplants. ^United Kingdom: England, Wales, & Northern Ireland (Scotland data reported separately). Data for France include 22 regions. Data for Sri Lanka is from 7 government hospitals. Data from Canada excludes Quebec. Abbreviation: ESRD, end-stage renal disease.

vol 2 Figure 13.19 Prevalence of treated ESRD patients with a functioning kidney transplant, per million population, by country, 2014



Data source: Special analyses, USRDS ESRD Database. Data presented only for countries from which relevant information was available. The prevalence is unadjusted. ^United Kingdom: England, Wales, & Northern Ireland (Scotland data reported separately). Data for Spain include 18 of 19 regions. Data for France include 22 regions. Data for Italy includes 6 regions. Data for Canada excludes Quebec. Abbreviations: ESRD, end-stage renal disease; sp., speaking.

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