

# **ESRD Patients in 2008**

A Global Perspective



Fresenius Medical Care

# Contents

Preface .....	3
Global View of ESRD Patients .....	4
Global View of Dialysis Patients .....	6
Global View of Haemodialysis Patients .....	9
Global View of Peritoneal Dialysis Patients .....	10

# Preface

The information presented here on global end-stage renal disease (ESRD) demographics and selected trends was retrieved in the 2008 global Fresenius Medical Care survey. Of the more than 230 countries (or areas of special sovereignty) worldwide, 146 countries are reported to provide dialysis care to patients with renal failure. The annual Fresenius Medical Care survey collects and consolidates data from these countries, thereby providing a unique insight into the ESRD and dialysis patient populations, their global distributions and the treatment modalities employed.

In numerous countries, renal registries and other official organisations are valuable sources of extensive information on various aspects of ESRD demographics, treatment practices and outcomes. Such information provides a solid base for international comparisons and aids understanding of treatment policies and their implications for the well-being of patients. Conclusions drawn from such data provide knowledge of value to both medical communities and policy makers throughout the world.

However, data collection and analysis requires extensive resources, and a time lapse between data collection and publication is unavoidable. In addition, a complete global picture cannot be derived from national registry data alone, as a significant portion of the countries that provide dialysis care do not have official renal registries or do not publish corresponding data. Through its worldwide network, Fresenius Medical Care is in a position to efficiently retrieve and process ESRD patient demographic data on a global and regional level. Key results are presented here.

# Global View of ESRD Patients

<b>ESRD Patients</b>	<b>2,310,000</b>
thereof HD	1,585,000
thereof PD	190,000
thereof Tx	535,000
<b>World Population</b>	<b>6.7 billion</b>

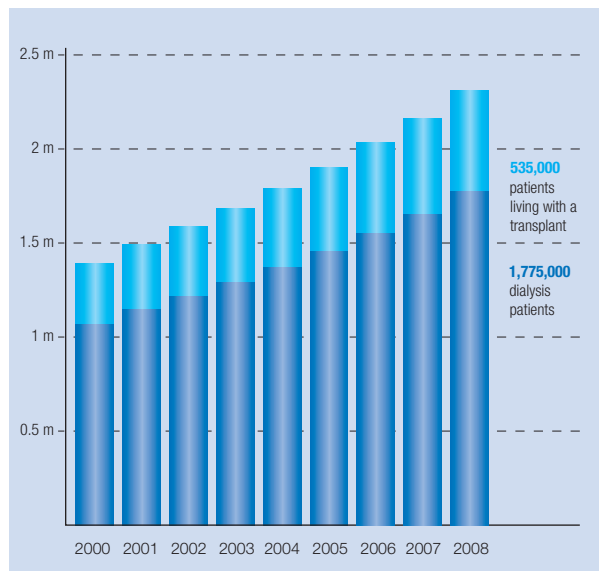
<b>Annual Growth Rates</b>	
World population	1.2%
ESRD	~ 7%
HD	7-8%
PD	~ 7%
Tx	~ 6%

The number of patients being treated for ESRD globally was estimated to be 2,310,000 at the end of 2008 and, with a 7% growth rate, continues to increase at a significantly higher rate than the world population.

Of these 2,310,000 ESRD patients, approximately 1,775,000 were undergoing dialysis treatment (haemodialysis (HD) or peritoneal dialysis (PD)) and around 535,000 people were living with kidney transplants (Tx).

The populations of ESRD patients, dialysis patients and patients living with a transplanted kidney have increased steadily over the past years, whereby consistently more than three-quarters of all ESRD patients were treated by dialysis.

The prevalence of treated ESRD patients in the general population shows a high global variation, ranging from under 100 to over 2,000 patients per million population (p.m.p.). ESRD prevalence is highest in Taiwan with around 2,420 p.m.p., closely followed by Japan with

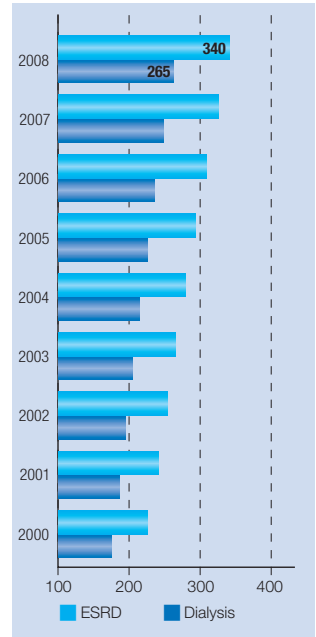


Development of ESRD patient numbers since 2000

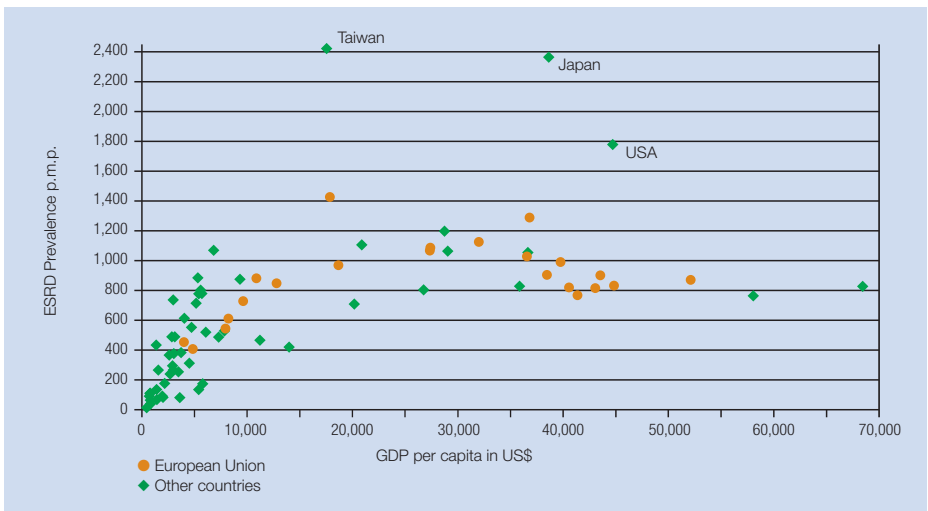
around 2,370 p.m.p. and then the USA with around 1,780 p.m.p. It averages about 970 p.m.p. in the 27 countries that make up the European Union (EU). The much lower global average of 340 p.m.p. suggests that, from the global perspective, access to treatment is still limited in many countries and a number of patients with terminal renal failure do not receive treatment. Increasing global prevalence values over the years indicate a general increase in the numbers of people requiring care for ESRD as well as a gradual improvement in the access to the treatment.

A comparison of national economic strength (expressed as gross domestic product (GDP)) with prevalence of ESRD suggests that economic factors may impose restrictions on treatment. A restriction is indicated in countries where the GDP per capita is below a limiting value. Further analysis shows that there is no correlation between economic strength and ESRD prevalence in countries with a GDP of over US\$10,000 per person per year.

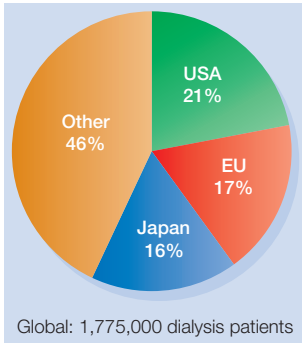
Development of global ESRD and dialysis prevalence values since 2000 (patients per million population)



Prevalence of ESRD vs. economic welfare in the 75 countries representing 98% of the global ESRD patient population



# Global View of Dialysis Patients



From a global view, most dialysis patients can be allocated to three major geographical regions: the USA, the European Union (EU) and Japan. 54% of all dialysis patients are treated in these 29 countries.

In fact, more than 50% of the global dialysis patient population is treated in just five countries – the USA, Japan, China, Brazil and Germany. The different values for the prevalence of dialysis in the five countries with the largest dialysis patient populations, ranging from as little as 70 in China to 2,250 p.m.p. in Japan, are an indication of the widely varying situation regarding dialysis treatment practices. The next 10 countries ranked by the size of their dialysis patient population (i.e. countries 6–15 in the table below) account for 23% of the global dialysis patient population and 25% of the world population. The remaining 130 different countries representing around 41% of the world population (i. e. countries 16–146).

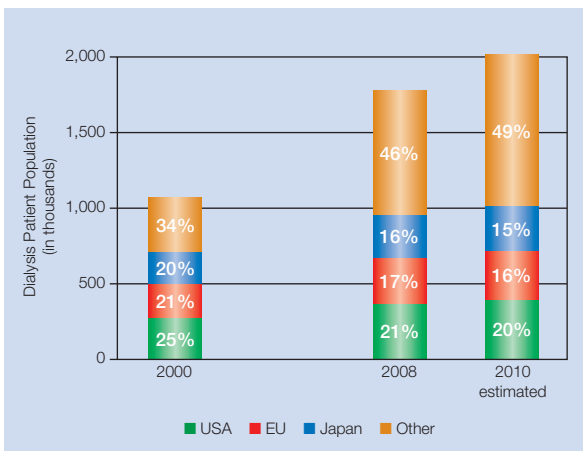
*Regional distribution of dialysis patients compared to the general population*

Countries ranked by dialysis population	Population (million)	% of world population	Dialysis patients (thousand)	% of total dialysis patients	Prevalence of dialysis (p.m.p.)
USA	305	5%	371	21%	1,215
Japan	127	2%	287	16%	2,250
China	1,334	20%	94	5%	70
Brazil	198	3%	88	5%	450
Germany	82	1%	76	4%	925
Countries 6 to 15	1,717	25%	407	23%	235
Countries 16 to 146	2,792	41%	452	26%	160
Countries 147 to 232	185	3%	0	0%	0
<b>Total</b>	<b>6,740</b>		<b>1,775</b>		<b>265</b>

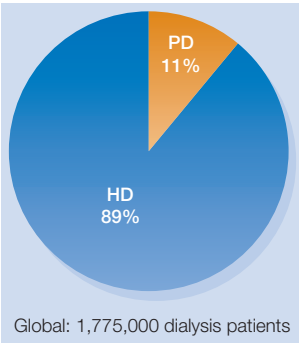
In the USA, Japan and the European Union, dialysis patient population growth rates between 2007 and 2008 were in a narrow range of 2–4% and, as such, were significantly lower than growth rates in regions such as Asia, Latin America, the Middle East and Africa. This variation in growth rates may be partially explained by differences in demographics and the maturity of dialysis programmes, i.e. an increasing access to dialysis programmes in developing countries.

Annual Regional Dialysis Population Growth Rates	
USA	3–4%
European Union	3–4%
Japan	2–3%
Other	11–13%
<b>Total</b>	<b>~ 7%</b>

Extrapolation of patient populations based on current growth rates suggests an ongoing trend towards a change in the regional distribution of patients: a significantly higher proportion of patients will undergo dialysis treatment in Asia, Latin America, Eastern Europe, the Middle East and Africa. This trend becomes particularly clear when present data are compared with corresponding data from the year 2000.



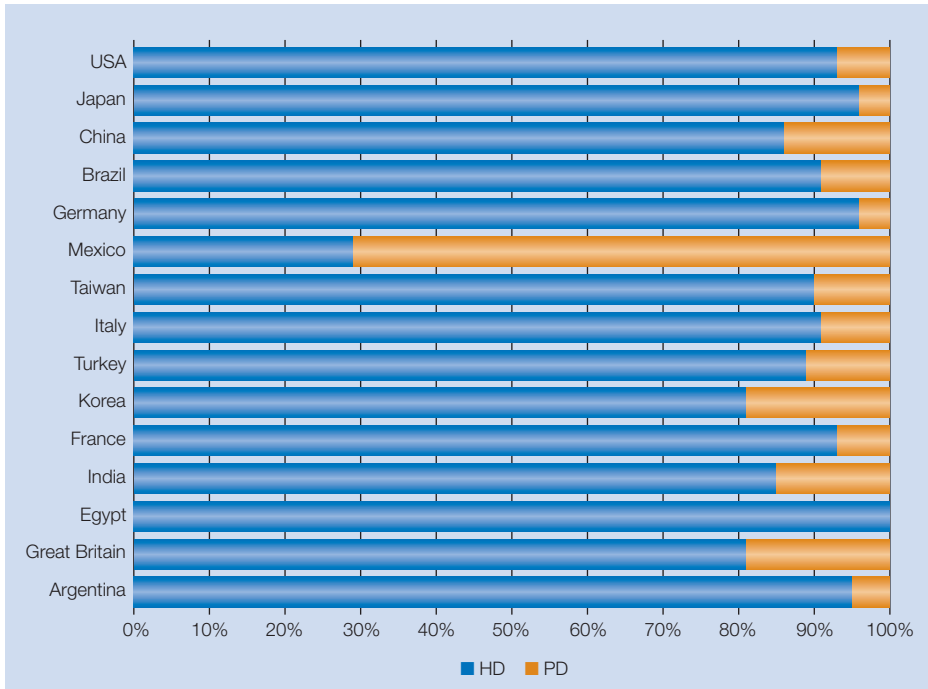
*Development of dialysis patient population split by geographical region*



At the end of year 2008, haemodialysis remained the most common treatment modality, with approximately 1,585,000 patients undergoing haemodialysis (89% of all dialysis patients) and around 190,000 patients undergoing peritoneal dialysis (11% of all dialysis patients).

Analysis of the 15 countries with the largest dialysis patient populations indicates that the global HD to PD distribution ratio is not reflected in all countries. Countries such as Mexico, the Republic of Korea and Great Britain have a significantly higher proportion of PD patients, while Japan, Germany, Egypt and Argentina have clearly less PD patients compared to the global average. With the exception of Mexico, HD is the predominant treatment modality in these 15 countries.

*Comparison of HD and PD patient numbers in the 15 largest countries ranked by total dialysis patient population*



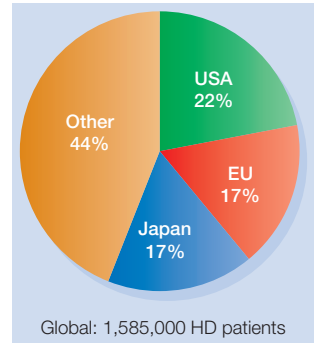


# Global View of Haemodialysis Patients

The global distribution and growth rate of haemodialysis patients strongly reflect the global distribution and growth rate of dialysis patients in general.

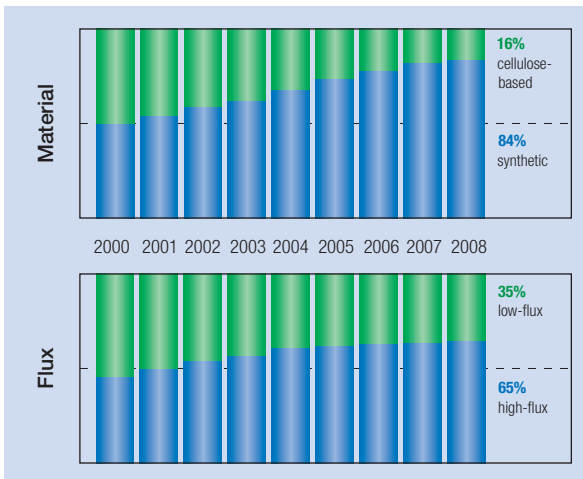
Most haemodialysis patients undergo treatment in dialysis centres. At the end of year 2008, it was estimated that the great majority of the 1,585,000 patients were treated in 27,600 centres worldwide with an average of 57 patients per centre. Further analysis reveals that 47% of dialysis centres lie within the public sector or belong to healthcare organisations, while the remaining 53% are private. However, large geographical variations are evident; for example, around 99% of centres are private in the USA (private nephrologists and company providers) while only around 40% are so in the European Union.

Analysis of the different dialyser types selected for the treatment of haemodialysis patients in 2008 and comparison with previous years showed a prevailing trend towards synthetic dialysis membranes and high-flux dialysers. Of all dialysers now utilized, around 84% contain a synthetic membrane and 65% are high-flux, while the corresponding values in the year 2000 were only 50% and 46%, respectively.



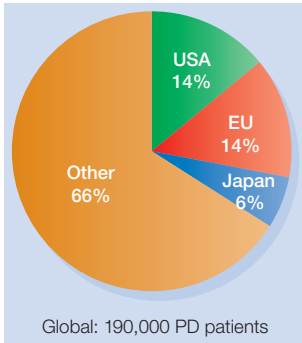
Annual Regional HD Population Growth Rates	
USA	3–4%
European Union	3–4%
Japan	2–3%
Other	11–13%
<b>Total</b>	<b>7–8%</b>

Global Patient and Centre Numbers	
HD patients	1,585,000
HD centres	27,600
<b>Average number of patients per centre</b>	<b>57</b>



Development of dialyser numbers by membrane type since 2000

# Global View of Peritoneal Dialysis Patients

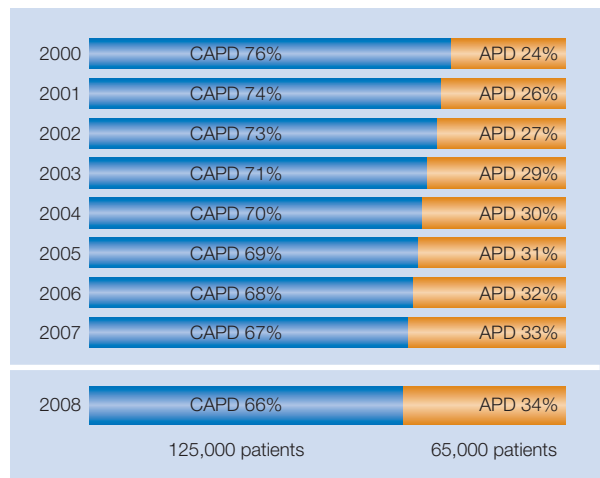


The regional distribution of peritoneal dialysis patients differs from that of both HD patients and dialysis patients in general in that Japan has fewer patients and the “Other” countries have more patients – only around 4% of dialysis patients are treated by peritoneal dialysis in Japan, while this treatment modality is relatively popular in some countries in Latin America and Asia.


With an average of 7%, peritoneal dialysis growth rates in 2008 was slightly lower than the corresponding haemodialysis growth rates. As in the case of HD, significantly higher growth rates were observed in Asia, Latin America, the Middle East and Africa (region “Other”) than in the three major single geographical regions (USA, EU and Japan). Growth in peritoneal dialysis was again driven by automated peritoneal dialysis (APD). Use of this modality increased by 9–10% in 2008 compared to a 5–6% increase for continuous ambulatory peritoneal dialysis (CAPD). Since 2000, utilisation of APD has increased from 24% of the total PD population to 34% today. Again, strong regional variations in the allocation of patients to either CAPD or APD are evident, with over 50% of patients undergoing APD in some countries.

Annual Regional PD Population Growth Rates	
USA	~ 0%
European Union	~ 1%
Japan	~ -3%
Other	10–12%
<b>Total</b>	<b>~ 7%</b>

Annual PD System Growth Rates	
CAPD	5–6%
APD	9–10%
<b>Total</b>	<b>~ 7%</b>



Comparison of CAPD and APD patients numbers since 2000



The data presented here is derived from information consolidated from 146 countries worldwide.

All data referring to ESRD patients, unless labelled otherwise, refer to the end of year 2008.

Growth rates displayed are the 2007 to 2008 annual growth rates.

All data referring to the European Union (EU) describe the status as in year 2008 (i.e. 27 countries).

Fresenius Medical Care AG & Co. KGaA is the world's leading provider of dialysis products and medical care for patients with chronic renal failure.



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