

# **CHAPTER 2**

## **Dialysis in Malaysia**

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**SECTION 2.1: PROVISION OF DIALYSIS IN MALAYSIA (registry report)**

*Information on provision of dialysis was obtained from data on individual patients reported to the registry shown in section 2.1 as well as from the centre survey carried out at the end of each year shown in section 2.2.*

**2.1.1 Dialysis treatment provision**

In 2006, 3570 patients commenced dialysis, giving a incident rate of 134 per million population. At year end 2006, a total of 15039 patients were reported to the registry as being on dialysis treatment giving a prevalence rate of 565 per million per year. By year end 2007, at least 16719 patients were on dialysis giving a prevalence rate for 2007 of at least 615 per million population. The proportion of dialysis patients lost to follow-up remained at less than 1%.

**Table 2.1.1:** Stock and flow- Dialysis Patients 1998-2007

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
New Dialysis patients	1253	1544	1840	2088	2348	2600	2868	3105	3570	3542
Died	376	493	594	816	927	1157	1272	1420	1673	1678
Transplanted	61	69	106	130	144	121	153	122	120	83
Lost to Follow-up	8	6	8	8	17	27	33	50	132	105
Dialysing at 31st Dec	4540	5540	6693	7846	9120	10436	11867	13385	15039	16719

**Table 2.1.2:** Dialysis Treatment Rate per million population 1998-2007

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Acceptance rate	56	68	78	87	96	104	112	119	134	130
Prevalence rate	205	244	285	327	372	417	464	512	565	615

**2.1.2. Geographic distribution**

Pulau Pinang, Melaka, Johor and Kuala Lumpur – the highest dialysis provision states now have incident rates of 200 or more per million state population. Dialysis provision rates in other states too have increased throughout the years. Pahang, Sarawak and Terengganu particularly have shown rapid increase in dialysis treatment rates. Terengganu demonstrates how advocacy with cash windfall can have dramatic increase in dialysis treatment rates.

**Table 2.1.3:** Dialysis Treatment Rate by State, per million state population 1998-2007

State	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Pulau Pinang	113	124	110	125	158	145	213	199	212	198
Melaka	106	88	150	154	175	185	210	170	199	192
Johor	71	104	131	138	148	146	155	168	205	167
Perak	64	76	105	103	115	129	146	168	181	150
Selangor & WP Putrajaya	77	93	83	94	111	119	123	134	148	141
WP Kuala Lumpur	137	122	157	188	172	193	205	199	215	213
Negeri Sembilan	95	97	116	110	131	147	157	155	147	192
Kedah	47	60	66	63	88	102	97	108	111	92
Perlis	45	49	72	104	103	128	95	102	127	108
Terengganu	34	36	37	75	90	66	80	100	102	164
Pahang	36	48	49	52	52	68	73	88	120	92
Kelantan	15	27	31	61	61	74	66	79	79	80
Sarawak	33	44	50	67	59	62	73	72	86	97
Sabah & WP Labuan	24	31	26	35	37	44	49	46	64	66

## SECTION 2.2: DIALYSIS PROVISION IN MALAYSIA (Centre survey report)

Data submission of individual dialysis and transplant patients to the National Renal Registry which was entirely voluntary prior to 2006 is now made compulsory by the Private Health Care Facilities and Services Act 1996 and its Regulations 2006 which was implemented on 1st May 2006. This however only applies to private and NGO centres and data submission from centres managed by the Ministry of Health, Defence or the Universities is still voluntary. In addition, enforcement of this Act is still in the preliminary stages.

Dialysis centre surveys have been conducted in December of each year since 1999. This annual cross-sectional survey was carried out to describe the most current level and distribution of dialysis provision for both hemodialysis and peritoneal dialysis at the end of each year. This section reports the results of the centre survey carried out in December 2007. Dialysis provision is expressed in terms of number of centres, HD machines, treatment capacity (one HD machine to 5 patients) and patients.

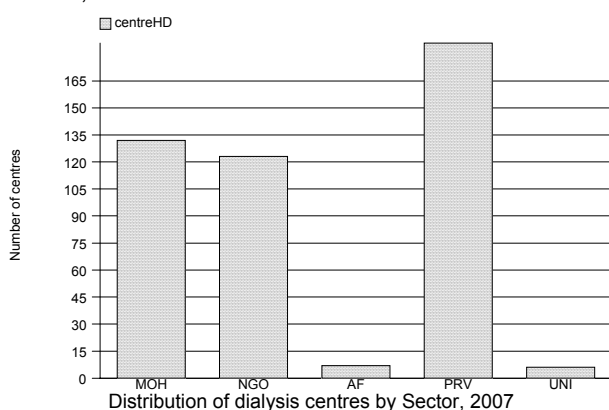
At the end of 2007, 454 hemodialysis centres and 33 CAPD centres provided dialysis care to 17367 patients. (Data on 16719 individual dialysis patients were reported to the Registry giving a dialysis patient ascertainment rate of almost 96%) The Ministry of Health (MOH) provided dialysis to 33.1% of patients, University and Armed forces 2%, non-governmental organizations (NGO) 30.1% and the private sector at 34.8%. Almost all private dialysis patients received centre haemodialysis treatment compared to the MOH sector where patients on chronic peritoneal dialysis (PD) made up 25% of all dialysis patients. There were no PD patients in NGO centres. (table 2.2.1)

Of the 3 main sectors, the private sector again had the largest number of dialysis centres but the NGO centres had the largest HD capacity. (fig 2.2.1 a & b) The Ministry of Health had the lowest HD treatment capacity to patient ratio at 1.49 in 2007. The HD capacity to patient ratio had increased further in the NGO sector from 1.72 in 2006 to 1.98 in 2007. (fig 2.2.1d)

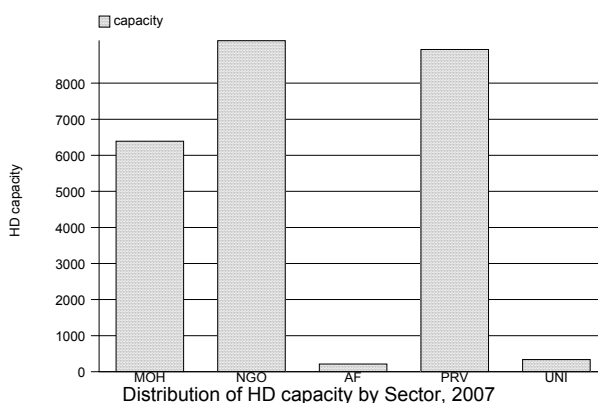
**Table 2.2.1:** Number of dialysis centres, HD machines and treatment capacity by sector, December 2007

sector	HD centre (No.)	Centre HD machines (No.)	Centre HD capacity (No.)	Centre HD patients (No.)	Centre HD capacity: patient ratio	CAPD centre (No.)	CAPD patients (No.)	All dialysis patients (No.)
MOH	132	1278	6390	4302	1.49	20	1444	5746
NGO	123	1836	9180	5228	1.76	0	0	5228
Private (PRV)	186	1787	8935	6026	1.48	9	12	6038
University (UNI)	6	67	335	169	1.98	3	82	251
Armed Force(AF)	7	43	215	99	2.17	1	5	104
TOTAL	454	5011	25055	15824		33	1543	17367

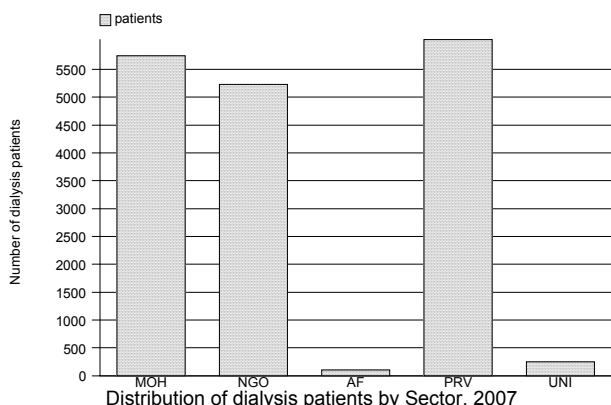
**Figure 2.2.1(a):** Distribution of dialysis centres by Sector, December 2007



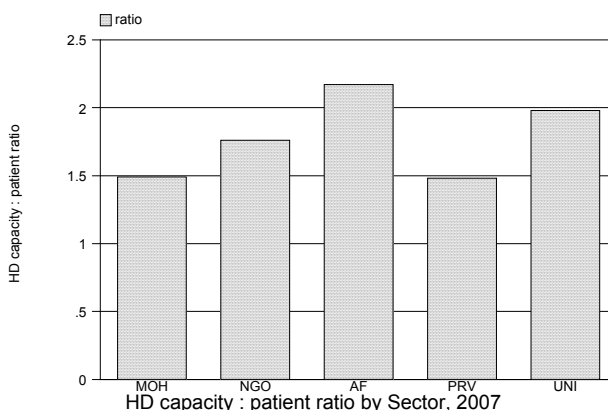
**Figure 2.2.1(b):** Distribution of HD capacity by Sector, December 2007



**Figure 2.2.1(c):** Distribution of dialysis patients by Sector, December 2007



**Figure 2.2.1(d):** HD capacity: patient ratio by Sector, December 2007



**2.2.2. Geographic distribution (centre survey)**

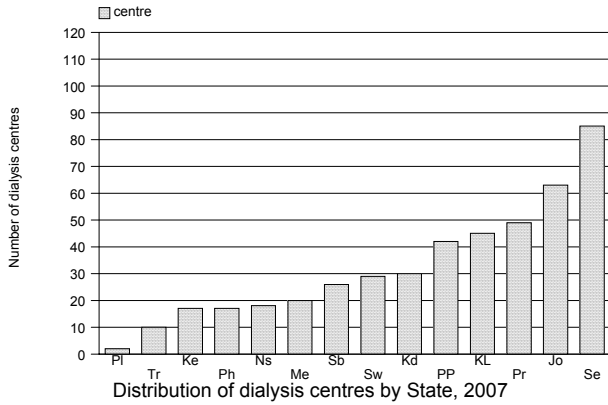
The economically advantaged states of Pulau Pinang, Melaka, Johor, Perak, Selangor, Kuala Lumpur and Negeri Sembilan had centre HD capacity rates and dialysis treatment rates above the national rate. There was a 5-fold difference in treatment rates between the states with the highest provision i.e. Kuala Lumpur and Pulau Pinang, and the state with the lowest treatment rate (Sabah). [table 2.2.2 (a)] Unlike in previous years, the HD capacity to patient ratio did not vary too widely between the different states.

Private sector and NGO dialysis were the main contributors to the large variation in centre HD provision rates between the various states. Private and NGO dialysis centres provided about 80% of the total dialysis provision in states with high dialysis provision rates and less than 50% in states with low dialysis provision rates except for Sarawak and Kedah.

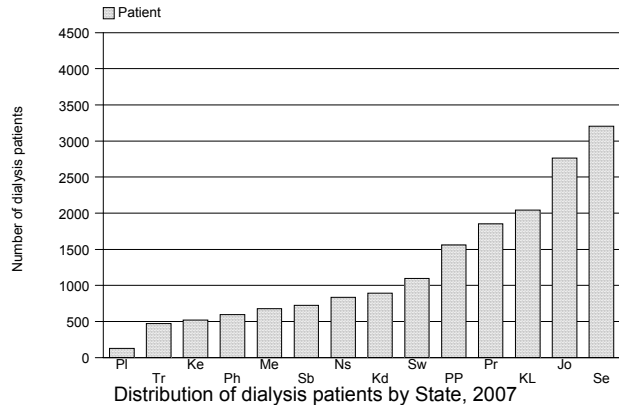
**Table 2.2.2(a):** Number of dialysis centres, number of HD machines and treatment capacity, HD capacity to patients ratio and number of dialysis patients by state in December 2007

State	Centre HD (No.)	Centre HD machines	Centre HD machines pmp	Centre HD capacity (No.)	Centre HD capacity pmp	Centre HD patients (No.)	Centre HD patients pmp	HD capacity: patient ratio	Centre PD patients (No.)	Centre PD patients pmp	All dialysis patients (No.)	Dialysis treatment rate pmp
Pulau Pinang	42	472	311	2360	1554	1402	923	1.68	158	104	1560	1027
Melaka	20	219	296	1095	1482	644	872	1.7	32	43	676	915
Johor	63	730	225	3650	1126	2557	789	1.43	206	64	2763	853
Perak	49	553	239	2765	1195	1780	769	1.55	71	31	1851	800
Selangor & WP Putrajaya	85	993	200	4965	1001	2954	595	1.68	251	51	3205	646
WP Kuala Lumpur	45	539	336	2695	1680	1735	1081	1.55	309	193	2044	1274
Negeri Sembilan	18	216	221	1080	1104	713	729	1.51	120	123	833	852
Kedah	30	298	155	1490	777	863	450	1.73	30	16	893	465
Perlis	2	39	168	195	841	130	561	1.5	0	0	130	561
Terengganu	10	115	108	575	538	384	360	1.5	88	82	472	442
Pahang	17	182	123	910	613	513	346	1.77	83	56	596	402
Kelantan	17	143	92	715	458	466	299	1.53	54	35	520	333
Sarawak	29	307	128	1535	638	1028	428	1.49	70	29	1098	457
Sabah & WP Labuan	26	202	66	1010	330	654	213	1.54	71	23	725	237
Malaysia	453	5008	184	25040	922	15823	582	1.58	1543	57	17366	639

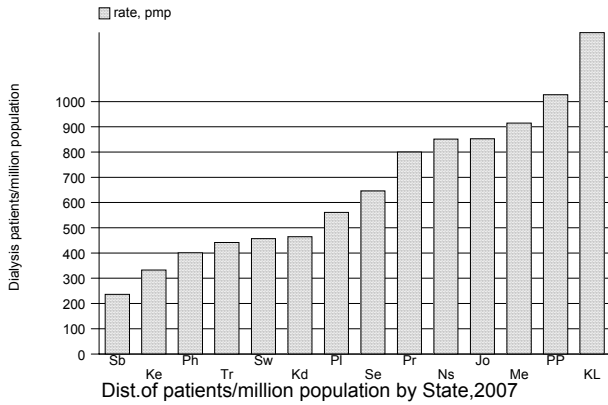
**Figure 2.2.2 (a):** Distribution of dialysis centres by State, December 2007



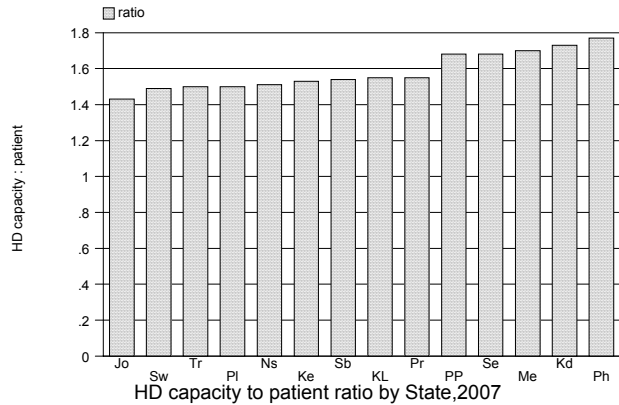
**Figure 2.2.2 (b):** Distribution of dialysis patients by State, December 2007



**Figure 2.2.2(c):** Distribution of dialysis treatment by State, December 2007



**Figure 2.2.2(d):** HD capacity to patient ratio by State, December 2007



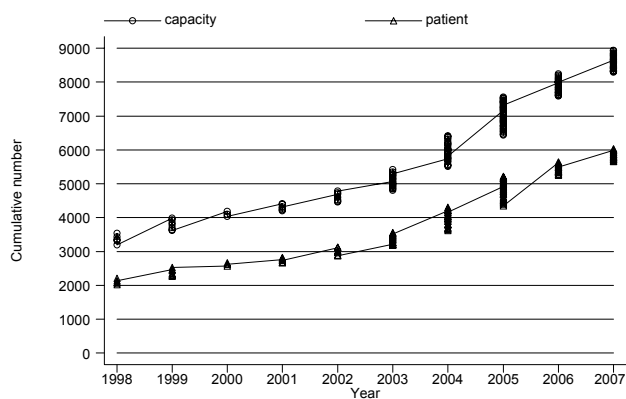
### 2.2.3 Growth in dialysis provision by sector

The number of patients on HD continued to increase in the private and NGO sector but has remained static over the last 3 years in the public sector. (table 2.2.3). The increase in HD capacity almost paralleled that of increase in number of HD patients for MOH and the private sector but showed a divergence in the NGO sector indicating that gap between HD capacity and patient intake is widening.

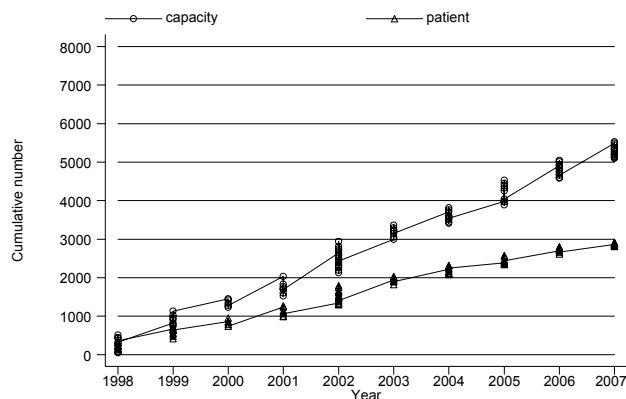
**Table 2.2.3:** Growth in HD capacity and HD patients in Private, NGO and MOH sectors, 1998-2007

Sector	Private		NGO		MOH	
	Cumulative HD capacity	Cumulative HD patients	Cumulative HD capacity	Cumulative HD patients	Cumulative HD capacity	Cumulative HD patients
1998	3540	2212	510	374	780	517
1999	3980	2533	1130	723	965	618
2000	4185	2660	1455	952	1245	815
2001	4410	2818	2040	1273	1640	1077
2002	4780	3135	2940	1796	2025	1379
2003	5420	3560	3365	2038	2260	1533
2004	6415	4303	3815	2325	2960	2059
2005	7555	5217	4525	2582	3800	2578
2006	8240	5644	5045	2801	4150	2677
2007	8935	6026	5525	2921	4170	2698

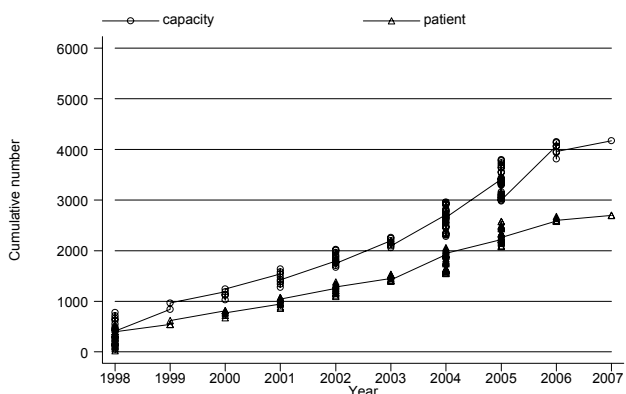
**Figure 2.2.3:** Growth in HD and HD patients in Private, NGO and MOH sectors, 1998-2007



Growth in HD capacity and patient, private sector 1998-2007



Growth in HD capacity and patient, NGO sector 1998-2007



Growth in HD capacity and patient, MOH sector 1998-2007

**SECTION 2.3: DISTRIBUTION OF DIALYSIS TREATMENT**

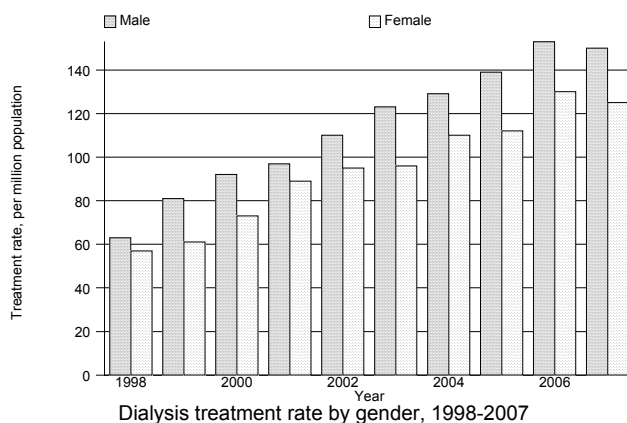
**2.3.1 Gender distribution**

The treatment gap between men and women accepted for dialysis has remained consistent over the years, suggesting this is a true reflection of the difference in ESRD incidence between the 2 sexes rather than any conscious or unconscious bias in treatment allocation. However, figure 2.3.1(ii) shows a convergence in the proportion of prevalent male and female patients. This is probably because of the survival advantage in female patients.

**Table 2.3.1(a):** Dialysis Treatment Rate by Gender, per million male or female population 1998-2007

Gender	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Male	63	81	92	97	110	123	129	139	153	150
Female	57	61	73	89	95	96	110	112	130	125

**Figure 2.3.1(a):** Dialysis Treatment by Gender 1998-



**Table 2.3.1(b):** Gender distribution of Dialysis Patients 1998-2007

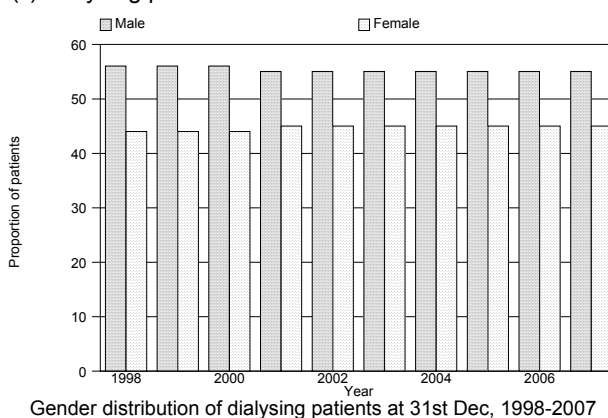
Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
New Dialysis patients	1253	1544	1840	2088	2348	2600	2868	3105	3570	3541
% Male	53	58	57	54	55	57	55	57	55	56
% Female	47	42	43	46	45	43	45	43	45	44
Dialysing at 31st December	4540	5540	6693	7846	9120	10436	11867	13385	15039	16718
% Male	56	56	56	55	55	55	55	55	55	55
% Female	44	44	44	45	45	45	45	45	45	45

**Figure 2.3.1(b):** Gender Distribution of Dialysis Patients 1998-2007

(i) New Dialysis patients



(ii) Dialysing patients at 31st December



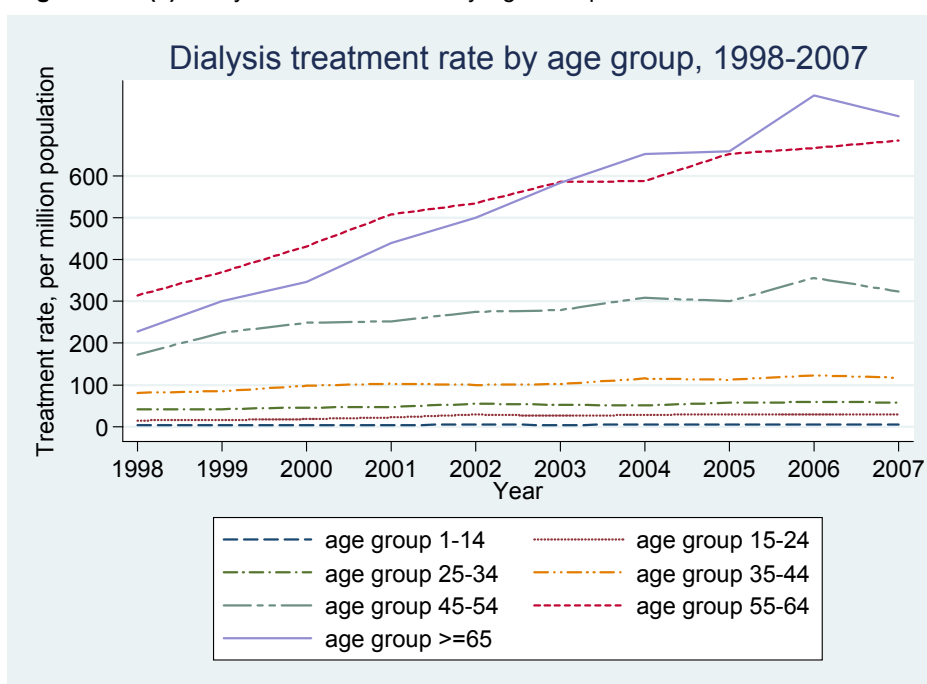
### 2.3.2 Age distribution

New dialysis treatment rates in the younger age-groups less than 45 years have remained unchanged in the last few years, suggesting that almost all patients with ESRD in those age groups who were in need of dialysis were able to access treatment. The treatment rate for patients 45 years and older have continued to increase. The most rapid increase in treatment rate is seen in those 65 years and above which showed more than 3-fold increase over the last 10 years.

**Table 2.3.2(a):** Dialysis Treatment Rate by Age Group, per million age group population 1998-2007

Age groups (years)	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<=14	3	4	4	4	5	4	5	5	5	5
15-24	15	16	18	22	29	26	28	30	30	29
25-34	41	42	46	47	55	52	51	57	59	58
35-44	81	85	98	103	100	102	115	112	123	117
45-54	173	225	249	252	275	279	309	300	356	324
55-64	314	370	432	508	535	586	588	653	667	685
>=65	228	301	347	439	500	584	653	660	793	743

**Figure 2.3.2(a):** Dialysis Treatment Rate by Age Group 1998-2007

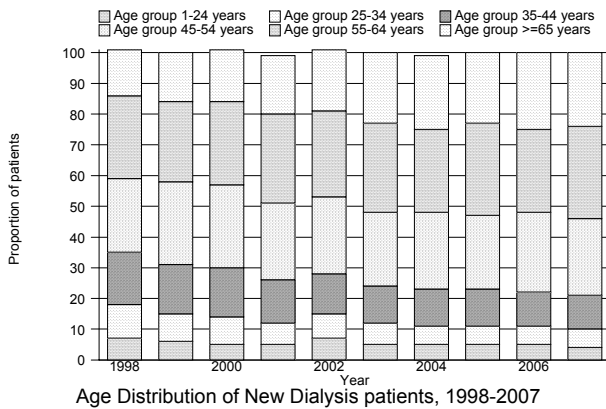


**Table 2.3.2(b):** Percentage Age Distribution of Dialysis Patients 1998-2007

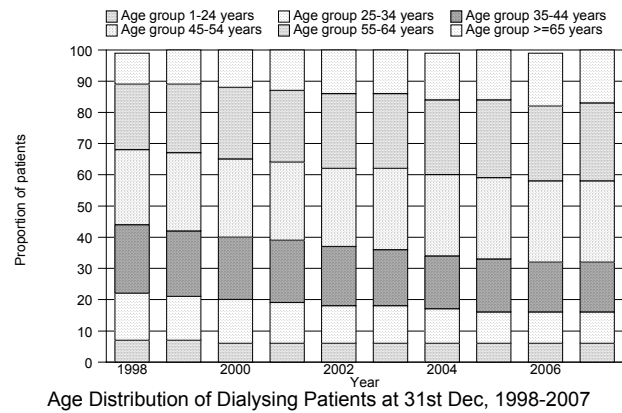
Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
New Dialysis patients	1253	1544	1840	2088	2348	2600	2868	3105	3570	3542
% 1-14 years	2	2	1	1	2	1	1	1	1	1
% 15-24 years	5	4	4	4	5	4	4	4	4	3
% 25-34 years	11	9	9	7	8	7	6	6	6	6
% 35-44 years	17	16	16	14	13	12	12	12	11	11
% 45-54 years	24	27	27	25	25	24	25	24	26	25
% 55-64 years	27	26	27	29	28	29	27	30	27	30
% >=65 years	15	16	17	19	20	23	24	23	25	24
Dialysing at 31st December	4540	5540	6693	7846	9120	10436	11867	13385	15039	16719
% 1-14 years	2	2	1	1	1	1	1	1	1	1
% 15-24 years	5	5	5	5	5	5	5	5	5	5
% 25-34 years	15	14	14	13	12	12	11	10	10	10
% 35-44 years	22	21	20	20	19	18	17	17	16	16
% 45-54 years	24	25	25	25	25	26	26	26	26	26
% 55-64 years	21	22	23	23	24	24	24	25	24	25
% >=65 years	10	11	12	13	14	14	15	16	17	17

**Figure 2.3.2(b):** Age Distribution of New Dialysis patients 1998-2007

(i) New Dialysis patients



(ii) Dialysing patients at 31st December



### 2.3.3 Method and Location of dialysis

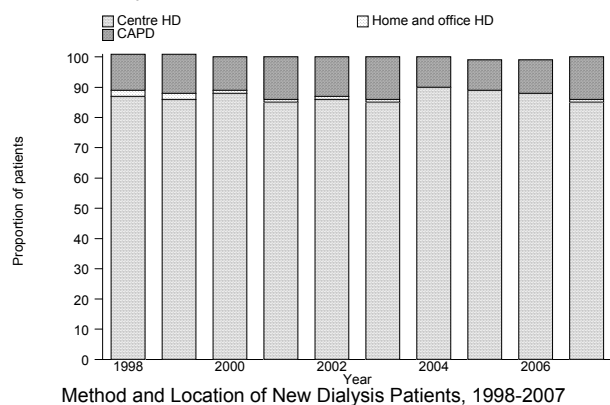
85% of new patients were accepted into centre haemodialysis in 2007. With the conscious effort by the MOH to place PD first, chronic PD accounted for about 14% of new dialysis patients. However, PD only accounted for 8% of prevalent dialysis patients in 2007. (table & fig 2.3.5)

**Table 2.3.3:** Method and Location of Dialysis 1998-2007

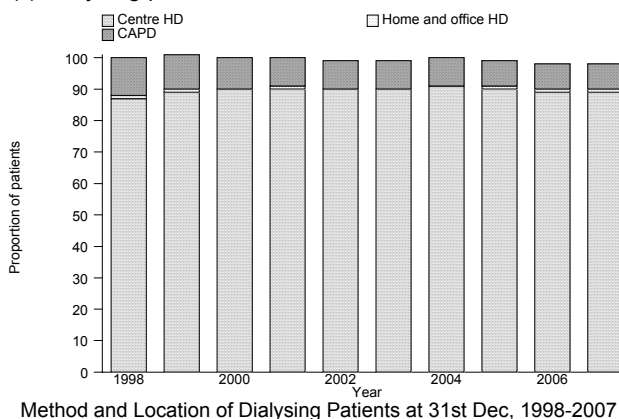
Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
New Dialysis patients	1253	1544	1840	2088	2348	2600	2868	3105	3570	3542
% Centre HD	87	86	88	85	86	85	90	89	88	85
% Home and office HD	2	2	1	1	1	1	0	0	0	1
% CAPD	12	13	11	14	13	14	10	10	11	14
Dialysing at 31st December	4195	5152	6247	7311	8501	9768	11143	12739	14456	15924
% Centre HD	87	89	90	90	90	90	91	90	89	89
% Home and office HD	1	1	0	1	0	0	0	1	1	1
% CAPD	12	11	10	9	9	9	9	8	8	8

**Figure 2.3.3:** Method and Location of Dialysis patients 1998-2007

(i) New Dialysis patients



(ii) Dialysing patients at 31st December



### 2.3.4 Funding for Dialysis Treatment

A patient may need to obtain funds from multiple sources for his dialysis treatment. In the initial years of the registry, data for funding for dialysis treatment were mainly from the initial notification of the patient. In 2006, data on funding was included in the annual returns.

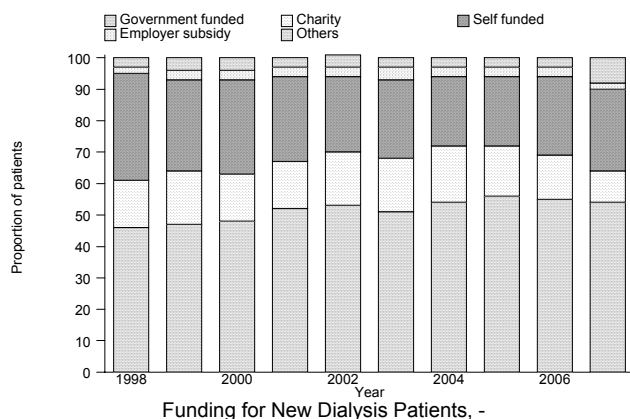
The government continues to be the main payer for dialysis therapy. These funds are channeled not only to the government dialysis centres but also as subsidies to NGO centres and payment of dialysis treatment for civil servants and their dependents in the private centres. A quarter of patients paid for their dialysis treatment. Funding from NGO bodies accounted for between 10-18% over the last 10 years. (table & fig 2.3.4)

**Table 2.3.4:** Funding for Dialysis Treatment 1998-2007

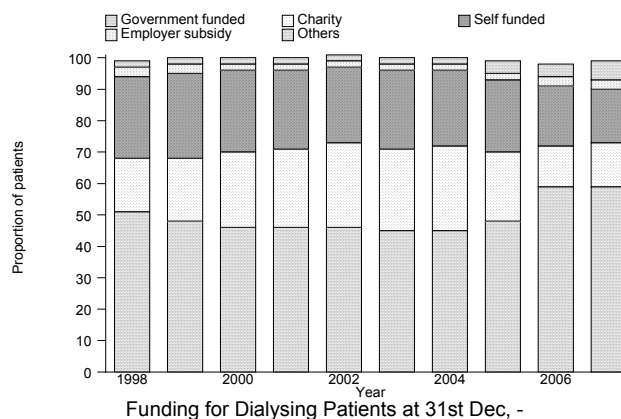
Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
New Dialysis patients	1253	1544	1840	2088	2348	2600	2868	3105	3570	3542
% by Government	46	47	48	52	53	51	54	56	55	54
% by Charity	15	17	15	15	17	17	18	16	14	10
% self funded	34	29	30	27	24	25	22	22	25	26
% subsidized by Employer	2	3	3	3	3	4	3	3	3	2
% Others	3	4	4	3	4	3	3	3	3	8
Dialysing at 31st December	4195	5152	6247	7311	8501	9768	11143	12739	14456	15924
% by Government	51	48	46	46	46	45	45	48	59	59
% by Charity	17	20	24	25	27	26	27	22	13	14
% self funded	26	27	26	25	24	25	24	23	19	17
% subsidized by Employer	3	3	2	2	2	2	2	2	3	3
% Others	2	2	2	2	2	2	2	4	4	6

**Figure 2.3.4:** Funding for Dialysis Treatment 1998-2007

(i) New Dialysis Patients



(ii) Dialysing patients at 31st December



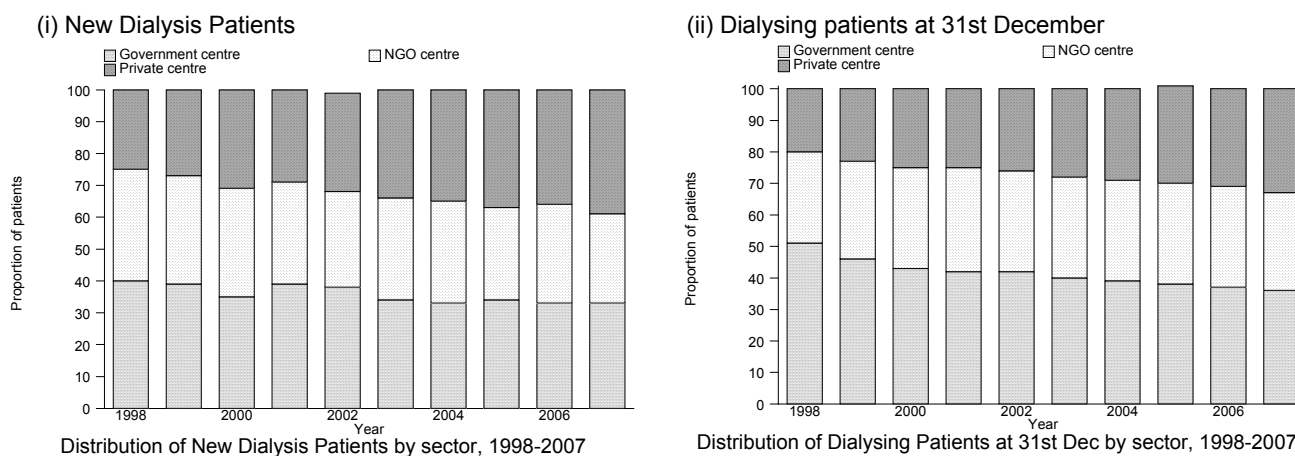
### 2.3.5 Distribution of dialysis patients by sector

Government centres continued to provide dialysis treatment to one third of new patients, the private sector 39% and the NGO sector 28% in 2007. The proportion of prevalent dialysis patients in government centres continue to decrease with a corresponding increase in proportion of prevalent patients in private centres.

**Table 2.3.5:** Distribution of Dialysis Patients by Sector 1998-2007

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
New Dialysis patients	1253	1544	1840	2088	2348	2600	2868	3105	3570	3542
% Government centre	40	39	35	39	38	34	33	34	33	33
% NGO centre	35	34	34	32	30	32	32	29	31	28
% Private centre	25	27	31	29	31	34	35	37	36	39
Dialysing at 31st December	4535	5537	6690	7843	9118	10434	11865	13383	15038	16719
% Government centre	51	46	43	42	42	40	39	38	37	36
% NGO centre	29	31	32	33	32	32	32	32	32	31
% Private centre	20	23	25	25	26	28	29	31	31	33

**Figure 2.3.5:** Distribution of Dialysis Patients by Sector 1998-2007



**SECTION 2.4: PRIMARY RENAL DISEASE**

Diabetes mellitus continues to be the commonest cause of ESRD and has been the cause of at least half of new dialysis patients since 2002. Hypertension was the second commonest known cause of ESRD at about 7%. The proportion of patients with unknown primary renal disease was 27% in 2007. Glomerulonephritis as a cause of ESRD has decreased from 10% in 1997 to only 4% in 2006. Systemic lupus erythematosus (SLE) continue to contribute 1% of new ESRD patients.

**Table 2.4.1:** Primary Renal Disease 1998-2007

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
New Dialysis patients	1253	1544	1840	2088	2348	2600	2868	3105	3570	3542
% Unknown cause	32	29	28	30	30	28	27	26	25	27
% Diabetes Mellitus	41	41	45	46	50	53	54	56	58	57
% GN	10	10	9	6	6	5	4	5	4	4
% SLE	1	2	2	1	1	1	1	1	1	1
% Polycystic kidney	1	1	1	2	1	1	1	1	1	1
% Obstructive Nephropathy	5	4	3	3	3	3	2	2	3	3
% Toxic Nephropathy	0	1	0	1	0	0	0	0	0	0
% Hypertension	8	11	12	9	7	7	8	8	7	7
% Others	1	1	1	1	1	1	1	1	1	1

**Figure 2.4.1:** Primary Renal Disease for New Dialysis Patients 1998-2007

