

# **CHAPTER 3**

## **Economics of Dialysis**

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**Introduction**

Over the last 25 years, the Malaysia healthcare system been able to improve population health, including the rapid expansion of dialysis services. (Table 3.1) The expansion of dialysis service was such that by 2005, despite being only a developing country, Malaysia was able to achieve treatment rates comparable to those in developed countries. (Table 3.2, Figures 3.2(a) & 3.2(b))

**Table 3.1:** Trends in Malaysian GDP, population health and dialysis provision, 1980-2005

	1980	1990	2000	2005
GDP per capita (in 2005RM)	8114	10049	16914	19057
Life expectancy at birth (years)	66.9	70.3	72.6	73.7
Under 5 mortality (per 1,000)	42	22	14	12
Urban population (% of total)	42	49.8	61.8	67.3
Treated RRT incidence	4	20	84	123
Treated RRT prevalence	8	71	338	574

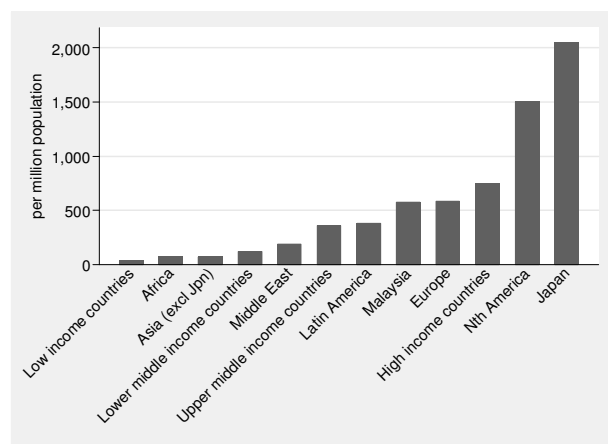
Data sources: International Monetary Fund World Economic Outlook Database, World Bank HNP Stats, Malaysian National Renal Registry.

**Table 3.2:** Prevalence of renal replacement therapy (RRT), dialysis and renal transplant among various regions in the world and by Countries' per capita Gross National Income (GNI) according to World Bank classification

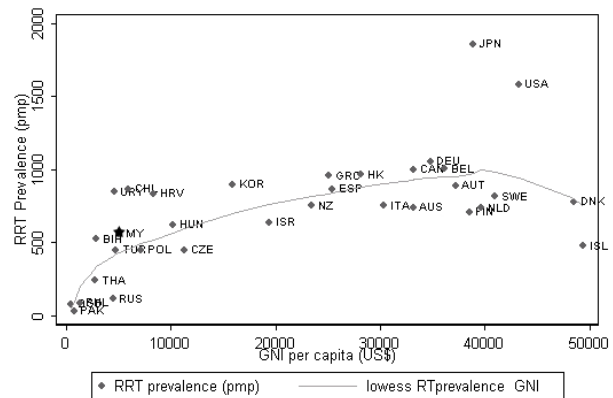
Region/ Country	Prevalence rate in per million population		
	RRT	Dialysis	Transplant
North America	1505	1030	470
Europe	585	400	185
Japan	2045	1945	100
Asia (excluding Japan)	70	60	10
Latin America	380	320	65
Africa	70	65	5
Middle East	190	140	55
Malaysia (GNI USD5070)	574	512	64
High income countries (GNI>USD 9386)	748	-	-
Upper middle income countries (GNI USD3036- 9385)	360	-	-
Lower middle income countries (GNI USD766- 3035)	120	-	-
Low income countries (GNI< USD 766)	37	-	-

Data Sources: Grassmann A, Gioberge S, Moeller S et al. ESRD patients in 2004: global overview of patient numbers, treatment modalities and associated trends. Nephrol Dial Transplant 2005; 20: 2587-2593  
White SL, Chadban SJ, Jan S, Chapman JR, Cass A. How can we achieve global equity in provision of renal replacement therapy? Bull World Health Organ. 2008;86:229-37

**Figure 3.2(a)** Prevalence of renal replacement therapy (RRT) among various regions in the world 2005 and by countries' per capita GNI according to World Bank classification



**Figure 3.2(b):** International comparison of income & RRT treatment prevalence, 2005

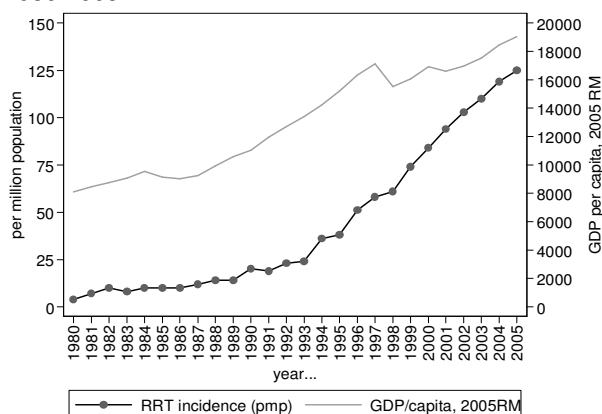


Data: USRDS Annual Data Report 2007, World Bank World Development Indicators

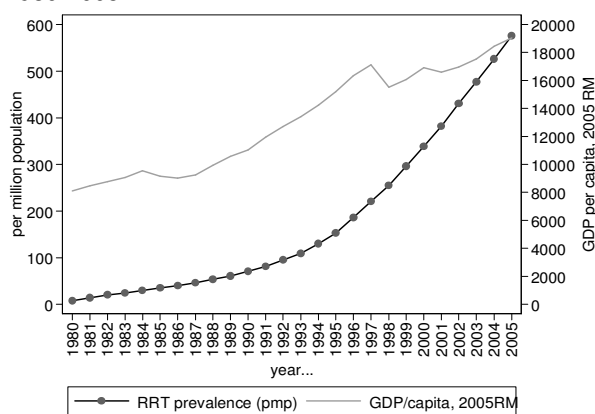
### Dialysis and income

The rapid increase in provision of dialysis from the mid-1990s was preceded by rapid economic growth since the late 1980s (Figures 3.1(a) & 3.1(b)). With economic growth more resources could be allocated to provide dialysis. Resources not only came from traditional Government sources but also the private sector and the public, such as through donations to charities or direct out of pocket payments for treatment (Table 3.3, Figures 3.3(a) & 3.3(b))

**Figure 3.1(a):** Dialysis incidence and GDP per capita, 1980-2005



**Figure 3.1(b):** Dialysis prevalence and GDP per capita, 1980-2005



Data sources: International Monetary Fund World Economic Outlook Database, Malaysian National Renal Registry.

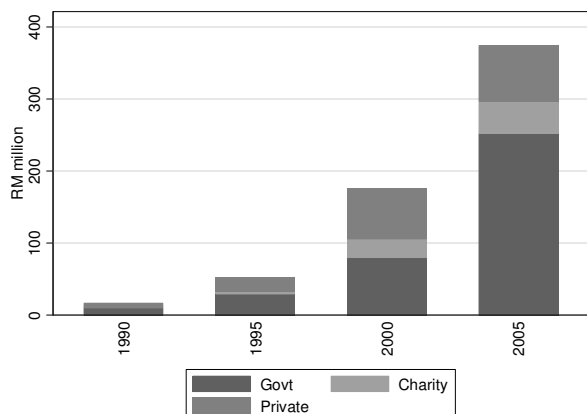
Data: International Monetary Fund World Economic Outlook Database, Malaysian National Renal Registry

**Table 3.3:** Trends in dialysis funding and provider mix

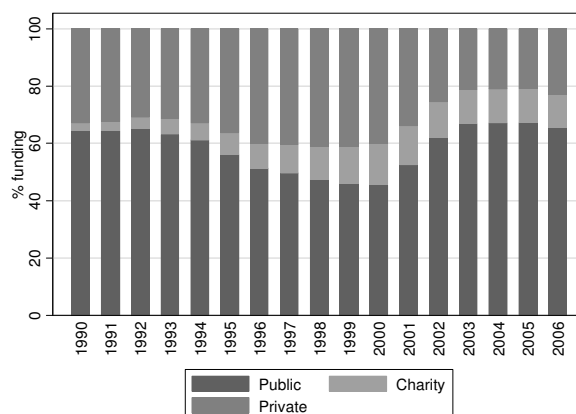
	1990	1995	2000	2005
Dialysis incidence	13	33	78	119
Dialysis prevalence	44	108	285	512
Sectoral share of provision (%)				
% Public	88	65	43	37
% NGO	5	20	34	32
% Private	7	15	23	30
Funding for dialysis (2005 RM million)				
Public	15.4	39.4	92.2	255.2
Charity	0.6	5.3	29.2	45.3
Private	7.9	25.5	81.0	78.6
Total	23.9	70.2	202.4	379.1
Funding for dialysis (%)				
% Public	64	56	46	67
% Charity	3	8	14	12
% Private	33	36	41	21

Note on total cost: expenditure estimate based on private sector inflation adjusted HD prices from 1990 to 2005 and govt HD/CAPD inflation adjusted costs in 1996 & 2001.

**Figure 3.3(a):** Dialysis funding by sector, 1990-2005 (RM million)



**Figure 3.3(b):** Dialysis funding by sector, 1990-2005 (%)



**Resource Generation**

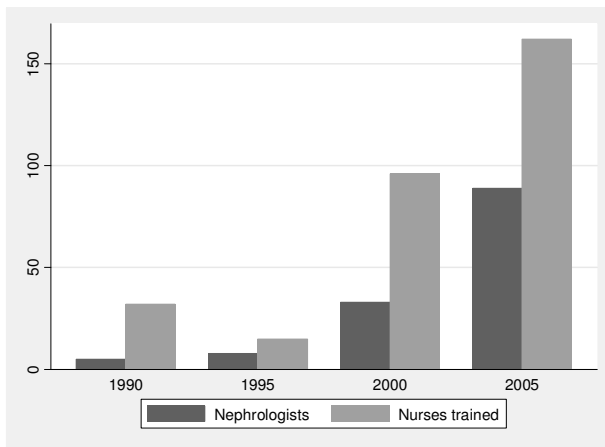
Equally as important as financial resources are the supporting infrastructure needed to provide treatment. Both the physical infrastructure (dialysis centres and HD machines) and human resources (nephrologists and paramedics) were able to expand rapidly in response to increased funding for dialysis. (Table 3.4, Figures 3.4(a) ,3.4(b) & 3.4(c)). Particularly important was the ability of Charity and Private sector providers to expand rapidly in the face of patient needs. (Table 3.3)

**Table 3.4:** Trends in resource generation for dialysis treatment 1990-2005

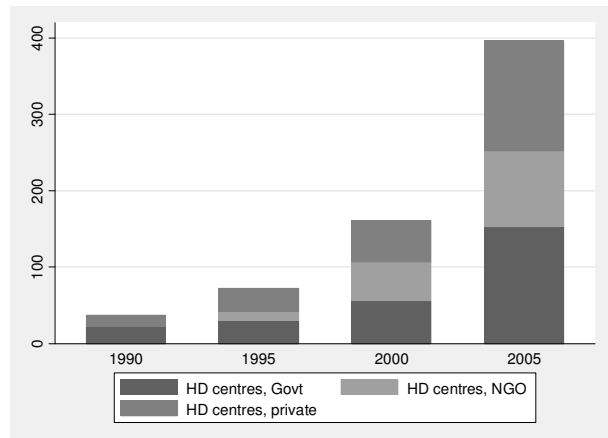
	1990		1995		2000		2005	
Resource generation for Dialysis								
Trained nephrologists, No.	5		8		33		89	
Trained dialysis nurses and medical assistants^, number per year (%)								
Public	32		15		96		124	(89)
Private							16	(11)
Total	32	(100)	15	(100)	96	(100)	140	(100)
HD facilities by sector, No. (%)								
Public	22	(9)	30	(42)	56	(35)	153	(39)
NGO	0	(0)	12	(17)	51	(32)	99	(25)
Private	15	(41)	30	(42)	54	(34)	144	(36)
Total	37	(100)	72	(100)	161	(100)	396	(100)
HD machine by sector, No. (%)								
Public					664	(30)	1142	(29)
NGO					830	(37)	1427	(37)
Private					750	(33)	1317	(34)
Total					2244	(100)	3886	(100)

^Trained by Ministry of Health and National Kidney Foundation.

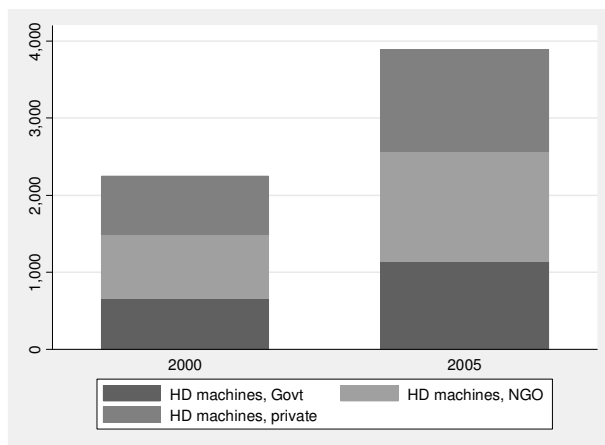
**Figure 3.4(a):** Dialysis human resources, 1990-2005



**Figure 3.4(b):** Haemodialysis centres by sector, 1990-2005



**Figure 3.4(c):** HD machines by sector, 2000-2005



**Dialysis prices and affordability**

Over the period from 1980 to 2005, while incomes and prices generally have increased, the price of private sector dialysis has remained relatively constant in nominal terms. Factored for inflation, the price of dialysis has declined in real terms. (Table 3.5) Over the period in review, the number of patients treated has increased by more than the spending on dialysis resulting in 1786 more patients being treated than would be the case if patient numbers had kept pace with funding. (Figures 3.5(a), 3.5(b) & 3.5(c)). The affordability of dialysis has improved, although at 65% of average household income needed to maintain one patient on dialysis, it remains a catastrophic illness for family finances when compared to affordability in most developed countries. (Table 3.6).

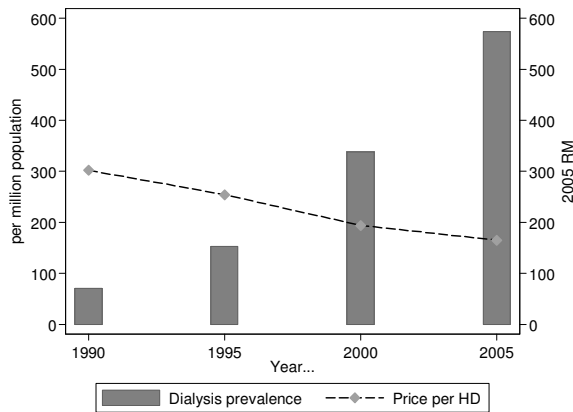
**Table 3.5:** Trends in dialysis market prices

	1990	1995	2000	2005
Dialysis prevalence	44	108	285	512
Price per HD (current RM)	170c	159d	163e	168f
Price per HD (2005RM)	286c	225d	191e	168f
Average Household monthly income (2005RM)	1963	2855	3012a	3356b
HD cost to monthly HH income (%)	186	103	83	65

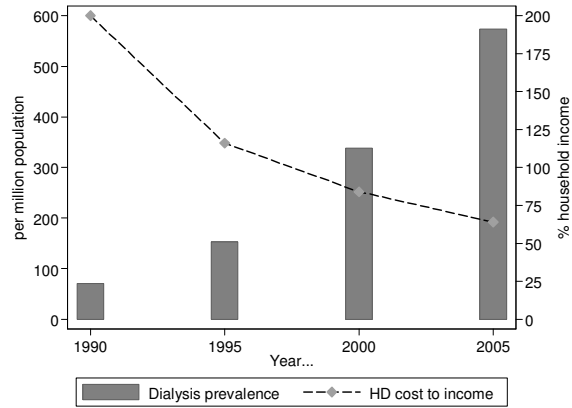
Note: a1999, b2004, c1992-5, d1996-9, e2000-2, f2003-5

Data: Private sector HD prices were from a 2007 survey of 12 private HD centres in Peninsular Malaysia, Malaysia Plan reports

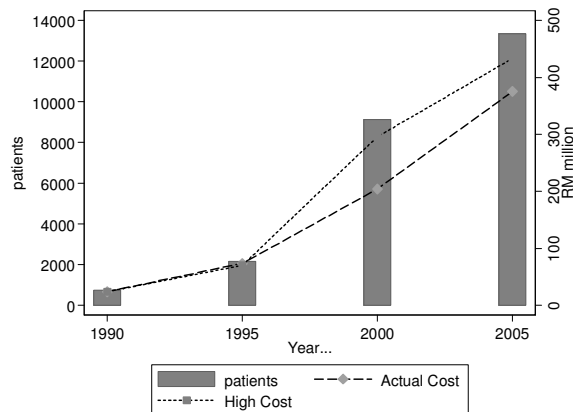
**Figure 3.5(a):** Trends in dialysis cost-efficiency (HD price in 2005 RM)



**Figure 3.5(b):** Trends in dialysis cost-efficiency (HD price as % of household income)



**Figure 3.5(c):** Trends in dialysis costs: Actual and assuming no efficiency gained



**Table 3.6:** International comparison of dialysis cost efficiency, 2005

	Malaysia	US	UK	Australia
Dialysis incidence	119	294	89	81
Dialysis prevalence	512	1105	375	424
Price per HD (2005RM/US\$/£/A\$)	168	150	168	163
Mean Household monthly income (2005RM/US\$/£/A\$)	3356	5279	2732	5670
HD cost* to monthly HH income (%)	65%	37%	80%	37%

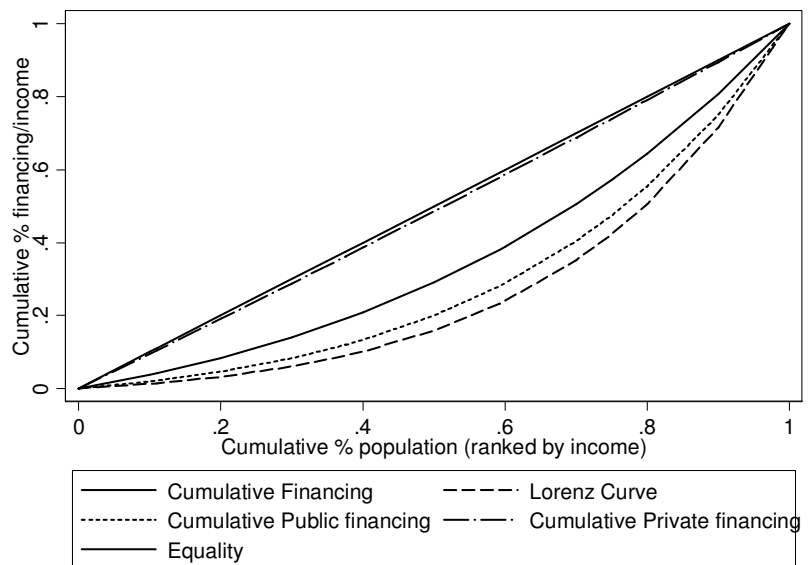
Note: \*assuming 13 HD procedures per month

In contrast the vertical equity of dialysis financing is inequitable, although public financing is less regressive than private financing as measured by the Kakwani Index. (Table 3.7, Figure 3.7)

**Table 3.7:** Dialysis financing equity, 2005

Sector	Index	
	Concentration	Kakwani
Public	0.41	-0.053
Private	0.02	-0.443
Overall	0.28	-0.18

**Figure 3.7:** Dialysis financing equity as measured by Kakwani index, 2005



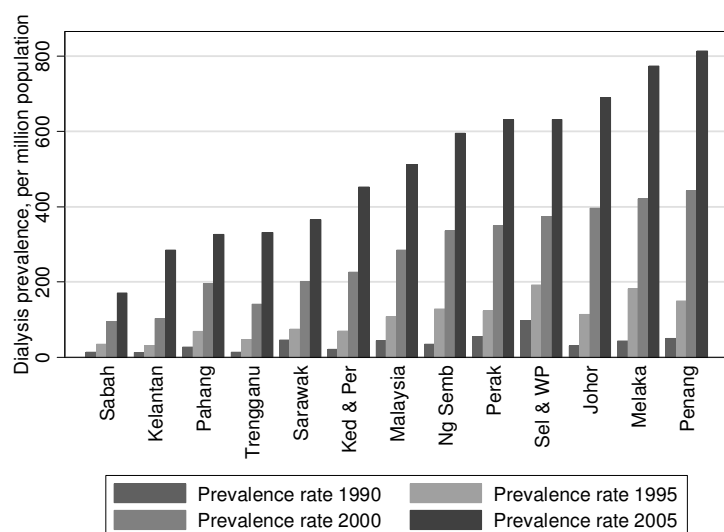
**Dialysis access and equality**

The provision of treatment is persistently concentrated towards more developed states where patients have greater ability to pay for treatment. However the extent of inequality in provision is declining across all sectors. Public sector provision now significantly favours those in less developed states while NGO and private provision still favours the more developed states (Table 3.8, Figure 3.8, Table 3.9, Figures 3.9(a) & 3.9(b)).

**Table 3.8** Geographic distribution of dialysis Treatment in Malaysia, 1990-2005

	1990	1995	2000	2005
Dialysis prevalence	44	108	285	512
Johor	30.4	114	395.3	689
Kedah & Perlis	20.8	69.8	226.1	453
Kelantan	12.6	31.2	102.8	285
Melaka	43.1	182	420.7	773
Negeri Sembilan	35	129	336	595
Pahang	26.6	68.9	195.2	326
Perak	53.7	124	349	631
Penang	50.1	149	442	814
Sabah	14	34.7	95.5	172
Sarawak	45	74.8	201.8	365
Selangor & WP Kuala Lumpur	97.7	191	373.8	632
Terengganu	14	46.6	140.7	332

**Figure 3.8:** Distribution of Dialysis treatment in Malaysia by state, 1990-2005

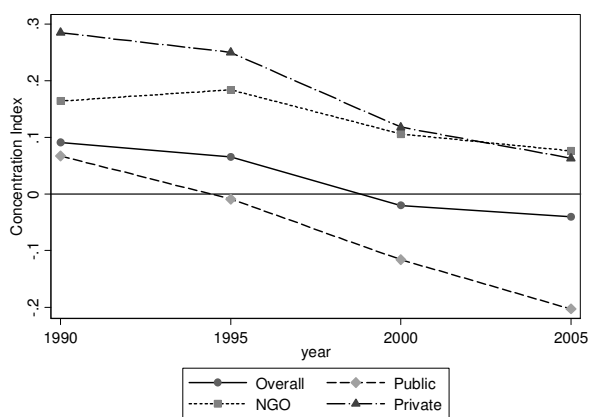


**Table 3.9:** Trends in dialysis geographic equity as measured by concentration indices

	1990	1995	2000	2005
Dialysis incidence	13	33	78	119
Dialysis prevalence	44	108	285	512
Overall Concentration Index (CI) of dialysis provision	0.091	0.065	-0.02	-0.04
CI of Public provision	0.067	-0.009	-0.116	-0.203
CI of NGO provision	0.164	0.184	0.106	0.076
CI of Private provision	0.285	0.25	0.118	0.063
Household Income inequality (Gini coefficient)	0.442	0.456	0.443*	0.462#

Note: \*2001, 2004

**Figure 3.9(a):** Trends in dialysis geographic equity in Malaysia, 1990-2005



**Figure 3.9(b):** Concentration curves of geographic distribution of dialysis treatment by provider sector, 2005

