

CHAPTER 8

CADAVERIC ORGAN AND TISSUE DONATION

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CADAVERIC ORGAN AND TISSUE DONATION

Compared with 2005, there was a marked increase in the number of potential donors referred to the National Transplant Procurement Unit (NTPMU) nationwide in 2006 with the consequent increase in cadaveric organ and tissue donations. Out of a total of 112 potential donor referrals (a rise of 80% from 2005), 25 actual donations materialised. This represents a twofold rise from 0.53 donations per million population (pmp) in 2005 to 1.01 donations per million population in 2006. Of these, 14 (56%) were multi-organ and tissue donations after brain death which were procured in the operating theatre, while 11 (44%) were tissue donations after cardiac death. Six of the tissue donations after cardiac death were for cornea only, one of which was carried out in the general ward, while the rest were multi-tissue donations which took place in the mortuary. In total 95 organs and tissues were procured in 2006 which included 38 eyes, 1 heart, 1 lung, 6 livers, 26 kidneys, 15 heart valves, 5 bones and 3 skin donations.

All the donors in 2006 were Malaysians except for one Taiwanese man who died while on a business visit here. Almost a quarter (6/25) came from Kuala Lumpur, followed by Perak (4/25) and Penang (4/25). As before, there were more male donors (76%) while the ethnic composition was formed mainly by the Chinese (48%) and Indians (44%) with a single Malay donor. Muslim donors made up 8% (2/25) of the total. The mean age was 35.7 ± 22.5 years with the majority (36%) being from the 10-19 years age group while almost a third of the donors (8/25) were 50 years and older. The oldest donor in 2006 was 77 years old who donated eyes only, while the youngest was a 3 year old multi-organ and tissue donor.

Majority of the donors (64%) were found in the ICU, but there were also three direct referrals for tissue donation from the mortuary. Only 1 out of the 25 donors (4%) carried the donor card. 68% (17/25) of the donations took place in MOH state hospitals, with 4 donations (16%) occurring in private hospitals, and 3 (12%) from University hospitals.

Half of the brain dead organ donors died from road accident related injuries while majority (45%) of post-cardiac death tissue donors died from heart related diseases. Forty percent (10/25) of the deaths of the donors in 2006 were from trauma related injuries while 2 were homicide cases. Of the 14 brain dead donors in 2006, group B rhesus positive was the most common blood group (36%), followed by A positive (29%) and O positive (21%), and only 2 (14%) from AB group. But when considered in totality from 1997 to 2006, blood group O positive was the most common (41%) followed by B positive and A positive.

Table 8.1: Number of procurement by year, 1997-2006

Number of procurement by year Total=162										
Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Number of donors	5	7	4	13	24	30	25	16	13	25
Rate of procurement (per million population)	0.25	0.34	0.19	0.59	1.07	1.31	1.07	0.67	0.53	1.01
Organs procured										
Cornea	4	10	6	18	34	48	40	20	22	38
Heart	1	3	2	3	4	0	2	0	1	1
Liver	0	0	2	1	1	2	1	3	3	6
Kidney	8	10	6	22	38	25	16	18	8	26
Heart valve	0	1	2	8	11	11	10	20	6	15
Bone	0	1	0	3	2	6	5	5	2	5
Skin	0	0	0	2	2	3	0	1	0	3
Lung	0	0	0	0	0	0	0	0	1	1

Figure 8.1: Number of procurement by year, 1997-2006

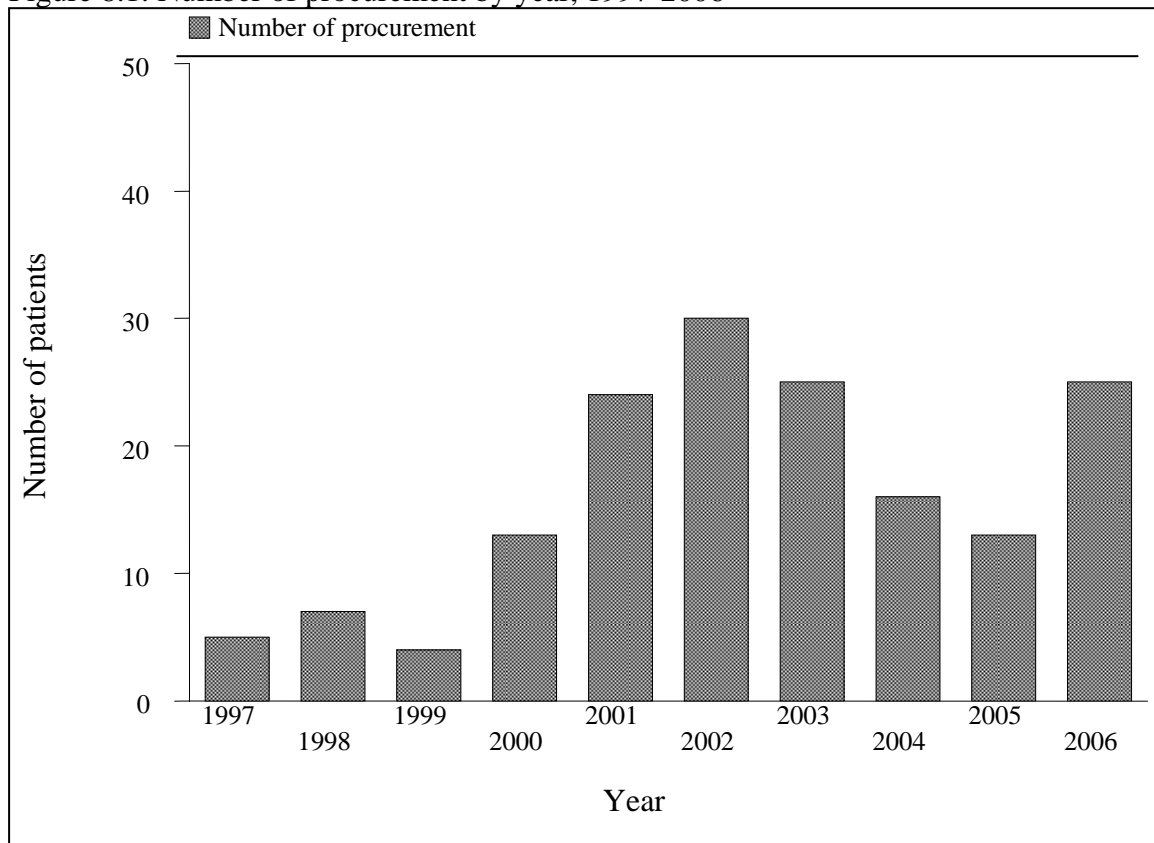


Table 8.2: Donor's age, 1997-2006

Donor's age (years)	1997 N=5		1998 N=7		1999 N=4		2000 N=13		2001 N=24		2002 N=30		2003 N=25		2004 N=16		2005 N=13		2006 N=25		Total N=162	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-9	1	20	0	0	0	0	1	8	1	4	1	3	1	4	1	6	1	8	2	8	9	6
10-19	0	0	1	14	2	50	7	54	2	8	3	10	4	16	3	19	1	8	9	36	32	20
20-29	1	20	3	43	2	50	1	8	6	25	6	20	4	16	3	19	2	15	2	8	30	19
30-39	1	20	0	0	0	0	0	0	5	21	1	3	2	8	2	13	1	8	1	4	13	8
40-49	0	0	1	14	0	0	2	15	4	17	8	27	4	16	4	25	2	15	3	12	28	17
50-59	1	20	2	29	0	0	1	8	4	17	7	23	3	12	3	19	1	8	2	8	24	15
60-69	0	0	0	0	0	0	1	8	2	8	1	3	3	12	0	0	3	23	4	16	14	9
70-79	0	0	0	0	0	0	0	0	0	0	3	10	3	12	0	0	1	8	2	8	9	6
80-89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	8	0	1	1
No data	1	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	5	7	4	13	24	30	25	16	25	13	30	25	39.36	46.38	32.50	46.38	35.72	36.65	36.65	36.65	36.65	36.65
Mean	27.25	34.43	20.50	25.23	36.83	41.87	39.36	32.50	46.38	32.50	41.87	39.36	46.38	35.72	32.50	46.38	35.72	36.65	36.65	36.65	36.65	36.65
SD	21.06	17.12	4.43	18.71	15.71	18.92	22.26	15.57	24.78	15.57	18.92	22.26	24.78	22.45	15.57	24.78	22.45	20.18	20.18	20.18	20.18	20.18
Median	28.00	25.00	21.00	17.00	37.00	46.00	40.00	31.50	48.00	31.50	46.00	40.00	48.00	23.00	31.50	48.00	23.00	37.00	37.00	37.00	37.00	37.00
Minimum	2	16	15	5	8	4	<1*	8	<1*	8	4	<1*	3	3	8	3	3	3	3	3	3	<1*
Maximum	21	57	25	60	66	79	77	55	81**	66	79	77	81**	77	55	81**	77	81**	77	81**	81**	81**

* The youngest tissue donor was 37 days old donated heart valves in 2003; the youngest organ donor was 2.5 years old donated kidneys and eyes in 2005.

** The oldest tissue donor was 81 years old donated eyes in 2005; the oldest organ donor was 65 years old donated kidneys in 2001.

Figure 8.2: Donor's age, 1997-2006

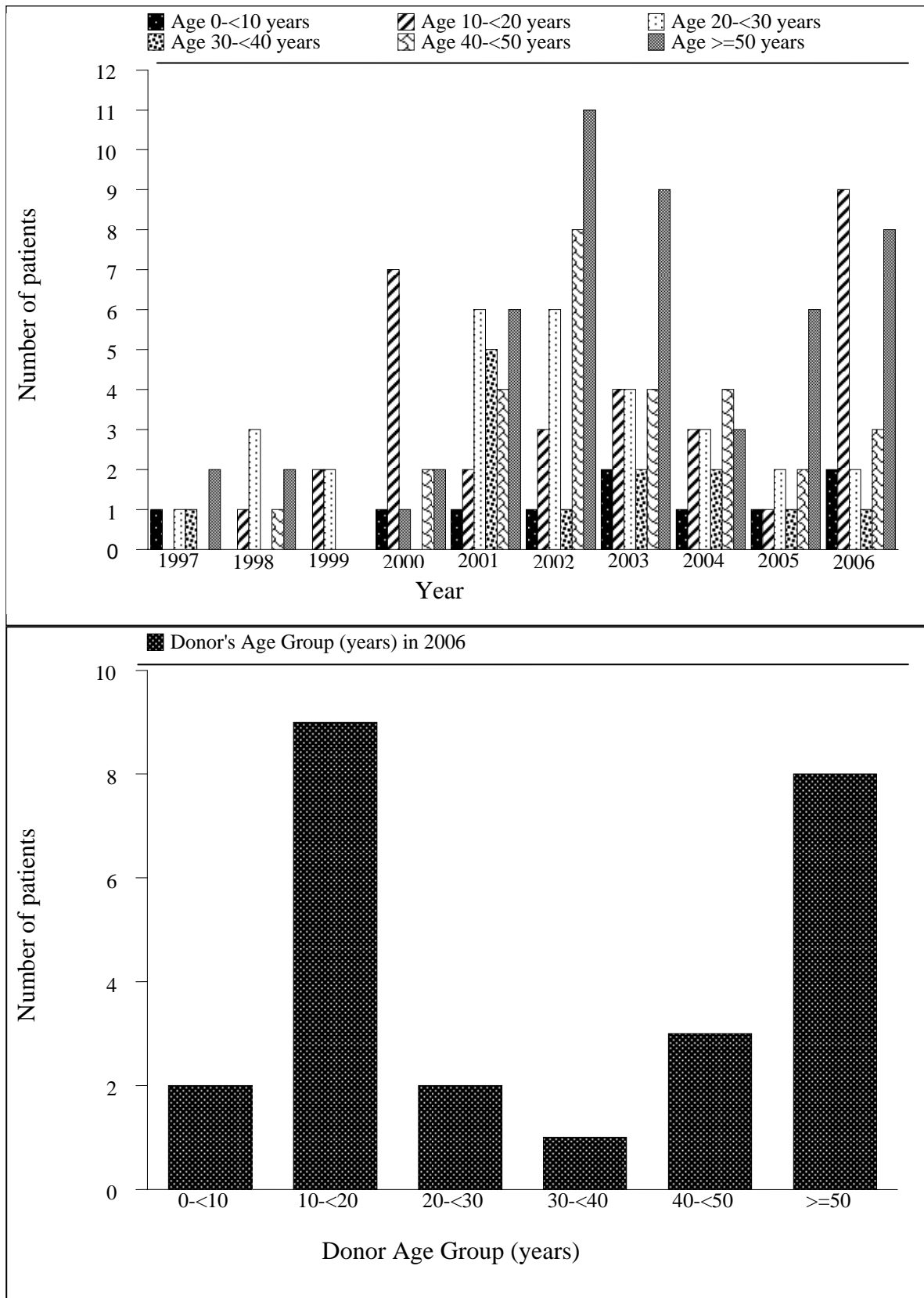


Table 8.3: Donor's gender, 1997-2006

Donor's gender	1997 N=5		1998 N=7		1999 N=4		2000 N=13		2001 N=24	
	No.	%	No.	%	No.	%	No.	%	No.	%
Male	3	60	7	100	3	75	11	85	20	83
Female	2	40	0	0	1	25	2	15	4	17

Donor's gender	2002 N=30		2003 N=25		2004 N=16		2005 N=13		2006 N=25		Total N=162	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	27	90	21	84	12	75	8	62	19	76	131	81
Female	3	10	4	16	4	25	5	38	6	24	31	19

Figure 8.3: Donor's gender, 1997-2006

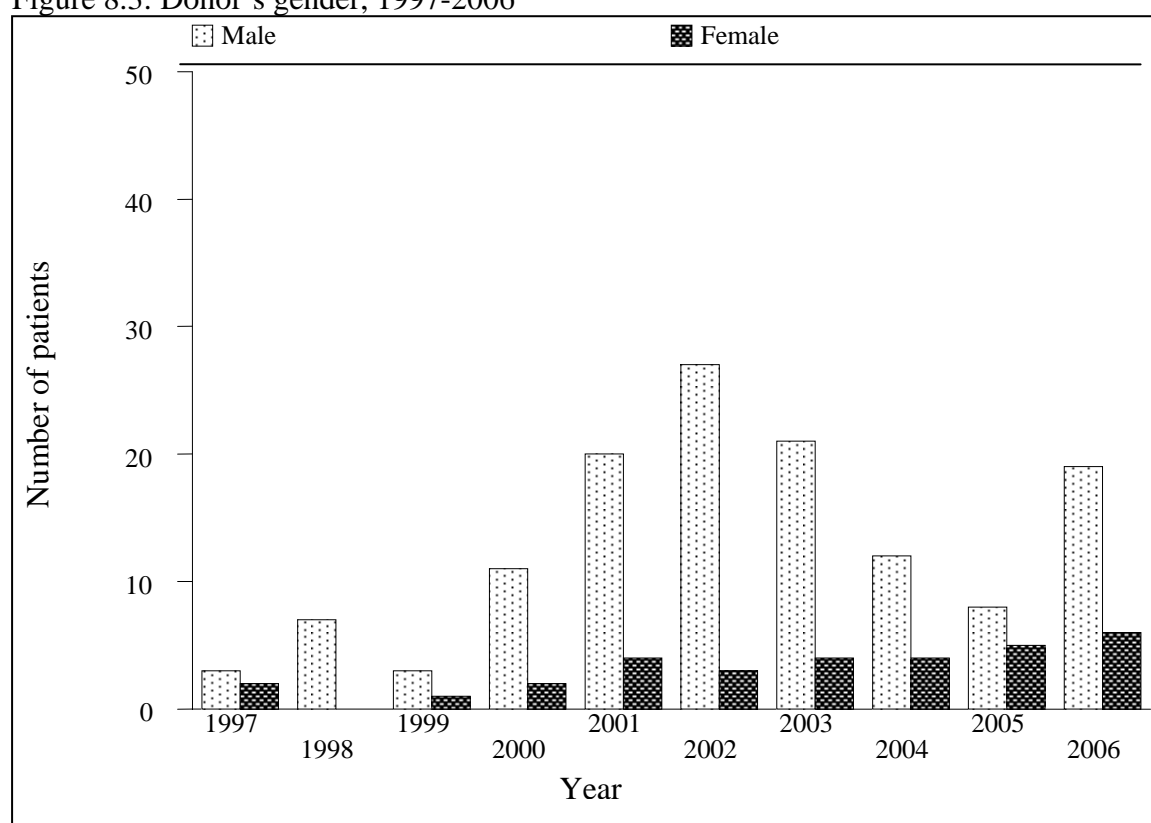


Table 8.4: Donor's ethnic group, 1997-2006

Donor's ethnic group	1997 N=5		1998 N=7		1999 N=4		2000 N=13		2001 N=24	
	No.	%	No.	%	No.	%	No.	%	No.	%
Malay	1	20	0	0	0	0	2	15	1	4
Chinese	3	60	4	57	4	100	7	54	17	71
Indian	1	20	3	43	0	0	3	23	4	17
Others	0	0	0	0	0	0	1	8	2	8

Donor's ethnic group	2002 N=30		2003 N=25		2004 N=16		2005 N=13		2006 N=25		Total N=162	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Malay	0	0	0	0	1	6	1	8	1	4	7	4
Chinese	13	43	14	56	14	88	5	38	12	48	93	57
Indian	15	50	9	36	1	6	7	54	11	44	54	33
Others	2	7	2	8	0	0	0	0	1	4	8	5

Figure 8.4: Donor's ethnic group, 1997-2006

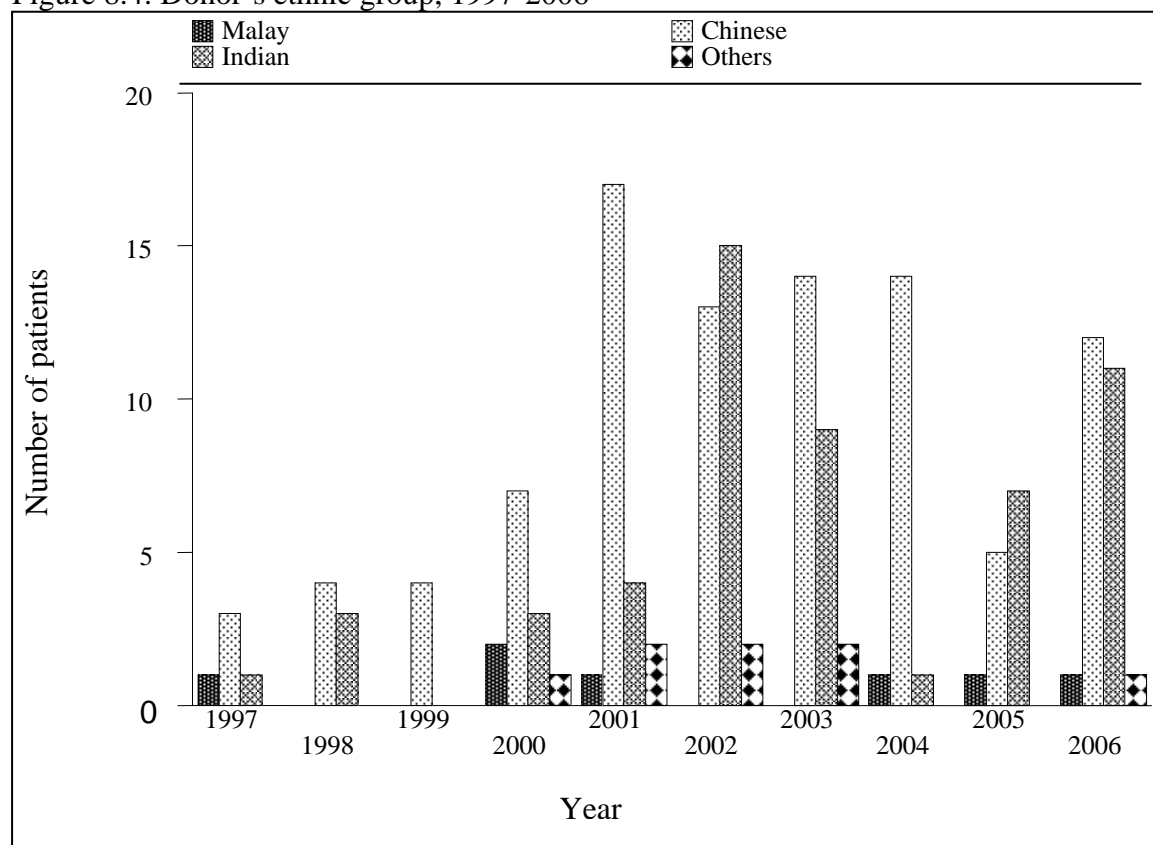


Table 8.5: Donor's religion, 1997-2006

Donor's religion	1997 N=5		1998 N=7		1999 N=4		2000 N=13		2001 N=24	
	No.	%	No.	%	No.	%	No.	%	No.	%
Islam	1	20	0	0	0	0	2	15	1	4
Buddhism	3	60	3	43	0	0	0	0	1	4
Hinduism	1	20	3	43	0	0	3	23	3	13
Christianity	0	0	0	0	0	0	1	8	0	0
Others	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	1	14	4	100	7	54	19	79

Donor's religion	2002 N=30		2003 N=25		2004 N=16		2005 N=13		2006 N=25		Total N=162	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Islam	0	0	1	4	2	13	1	8	2	8	10	6
Buddhism	5	17	15	60	14	88	5	38	12	48	58	36
Hinduism	13	43	8	32	0	0	5	38	10	40	46	28
Christianity	1	3	1	4	0	0	0	0	0	0	3	2
Others	0	0	0	0	0	0	2	15	0	0	2	1
Unknown	11	37	0	0	0	0	0	0	1	4	43	27

Figure 8.5: Donor's religion, 1997-2006

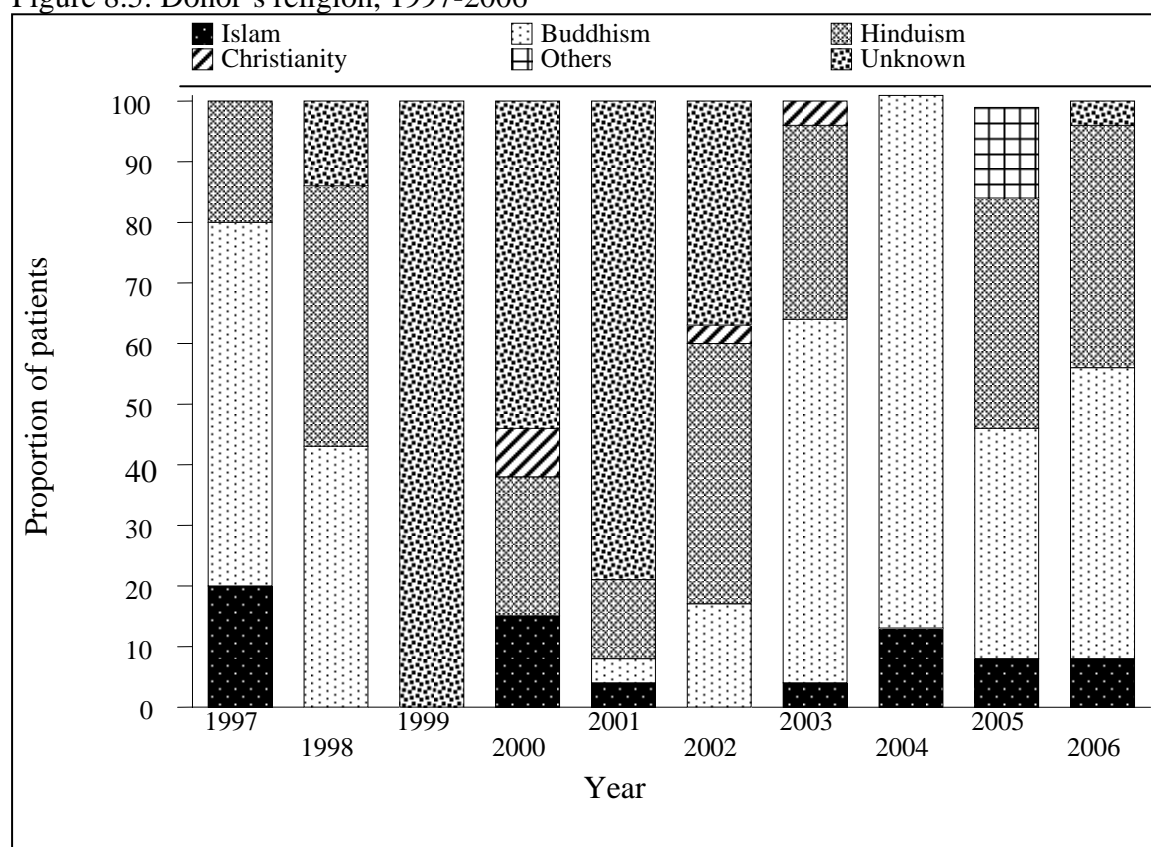


Table 8.6: Donor's nationality, 1997-2006

Donor's nationality	1997 N=5		1998 N=7		1999 N=4		2000 N=13		2001 N=24	
	No.	%	No.	%	No.	%	No.	%	No.	%
Malaysian	5	100	7	100	4	100	13	100	21	88
Non-Malaysian	0	0	0	0	0	0	0	0	3	13

Donor's nationality	2002 N=30		2003 N=25		2004 N=16		2005 N=13		2006 N=25		Total N=162	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Malaysian	29	97	24	96	16	100	13	100	24	96	156	96
Non-Malaysian	1	3	1	4	0	0	0	0	1	4	6	4

Figure 8.6: Donor's nationality, 1997-2006

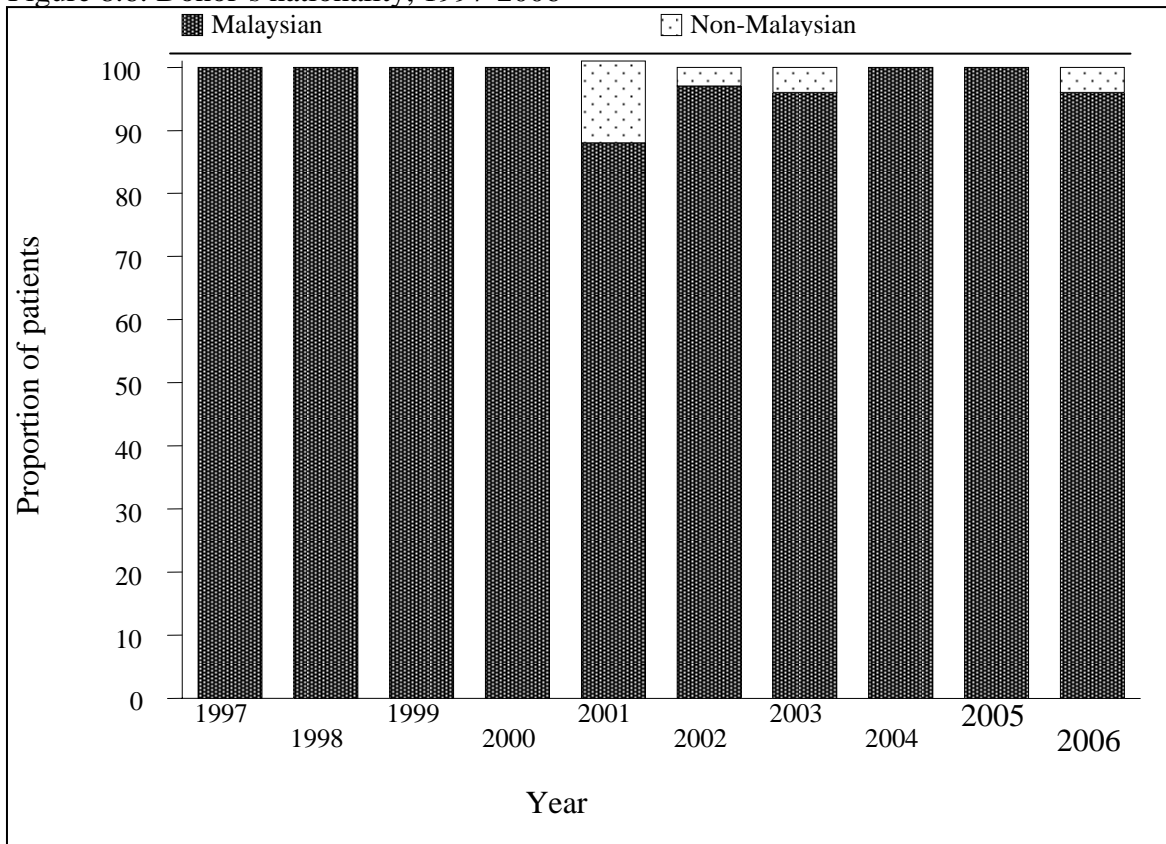


Table 8.7: Donor's state of residence, 1997-2006

Donor's state of residence*	1997 N=5		1998 N=7		1999 N=4		2000 N=13		2001 N=24		2002 N=30		2003 N=25		2004 N=16		2005 N=13		2006 N=25		Total N=162	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Johor	0	0	0	0	0	0	3	23	0	0	2	7	3	12	1	6	1	8	1	4	11	7
Malacca	0	0	1	14	1	25	0	0	0	0	1	3	2	8	0	0	1	8	2	8	8	5
Negeri Sembilan	0	0	1	14	0	0	1	8	0	0	1	3	4	16	0	0	1	8	2	8	10	6
Selangor	2	40	1	14	0	0	0	0	3	13	9	30	6	24	6	38	7	54	2	8	36	22
WP Kuala Lumpur	1	20	1	14	2	50	0	0	0	0	5	17	2	8	3	19	2	15	6	24	22	14
WP Putrajaya	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	1	1
Perak	1	20	2	29	1	25	3	23	0	0	4	13	0	0	2	13	1	8	4	16	18	11
Kedah	0	0	0	0	0	0	2	15	3	13	1	3	0	0	1	6	0	0	1	4	8	5
Perlis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pulau Pinang	0	0	0	0	0	0	1	8	3	13	1	3	3	12	2	13	0	0	4	16	14	9
Pahang	0	0	1	14	0	0	0	0	3	13	2	7	2	8	0	0	0	0	1	4	9	6
Terengganu	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	1	1
Kelantan	0	0	0	0	0	0	1	8	0	0	0	0	0	0	0	0	0	0	1	4	2	1
Sabah	0	0	0	0	0	0	2	15	1	4	0	0	1	4	1	7	0	0	0	0	5	3
Sarawak	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Others**	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	1	4	2	1
Unknown	1	20	0	0	0	0	0	0	10	42	3	10	1	4	0	0	0	0	0	0	15	9

*State of residence according to home address

** Others constitute donors who were foreigners, one from Yangon Myanmar in 2003 and another from Taiwan in 2006

Table 8.8: Donor's pledged status, 1997-2006

Donor's pledged status	1997 N=5		1998 N=7		1999 N=4		2000 N=13		2001 N=24	
	No.	%	No.	%	No.	%	No.	%	No.	%
Pledged donors	0	0	0	0	0	0	0	0	0	0
Non-pledged donors	5	100	7	100	4	100	13	100	24	100

Donor's pledged status	2002 N=30		2003 N=25		2004 N=16		2005 N=13		2006 N=25		Total N=162	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Pledged donors	5	17	6	24	2	13	3	23	1	4	17	10
Non-pledged donors	25	83	19	76	14	88	10	77	24	96	145	90

Figure 8.8: Donor's pledged status, 1997-2006

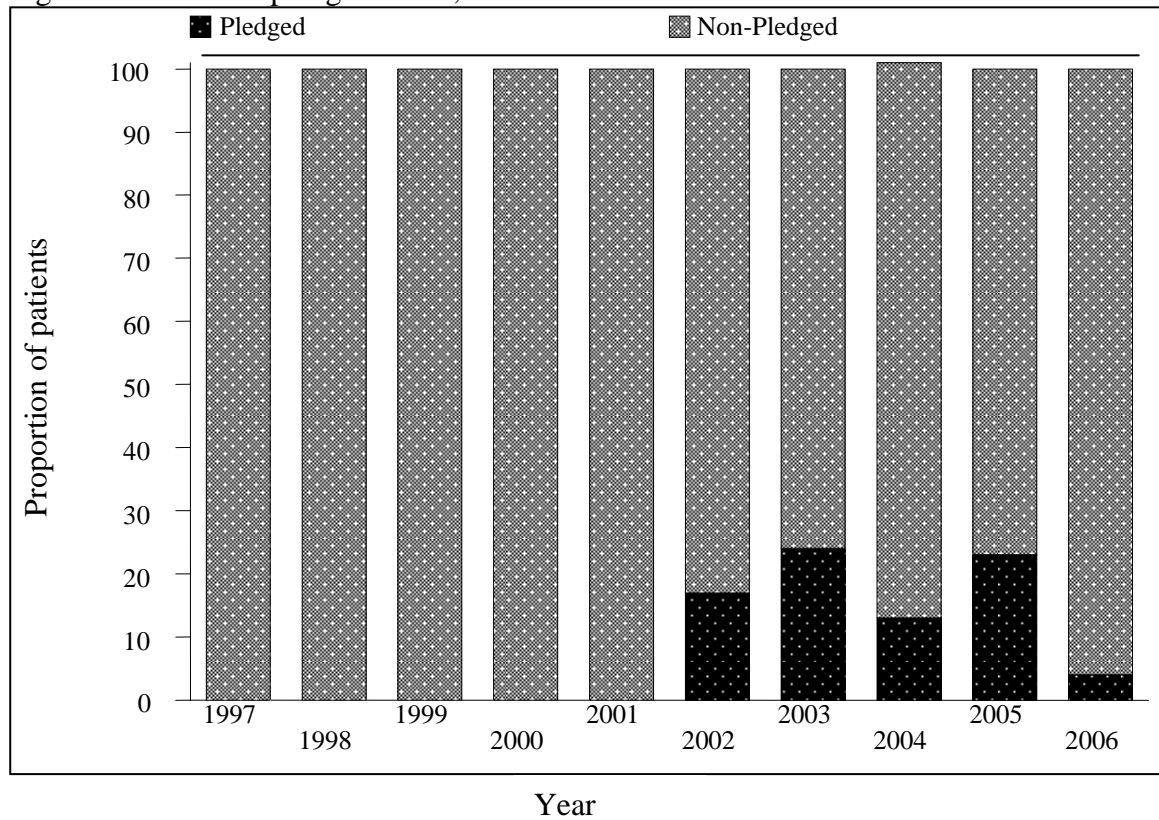


Table 8.9: Type of donors, 1997-2006

Type of donors	1997 N=5		1998 N=7		1999 N=4		2000 N=13		2001 N=24	
	No.	%	No.	%	No.	%	No.	%	No.	%
BD (Brain Death)	4	80	6	86	4	100	11	85	20	83
DCD (Donations after Cardiac Death) *	1	20	1	14	0	0	2	15	4	17

Type of donors	2002 N=30		2003 N=25		2004 N=16		2005 N=13		2006 N=25		Total N=162	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
BD (Brain Death)	17	57	8	32	10	63	5	38	14	56	99	61
DCD (Donations after Cardiac Death) *	13	43	17	68	6	38	8	62	11	44	63	39

*DCD involve tissue donation only

Figure 8.9: Type of donors, 1997-2006

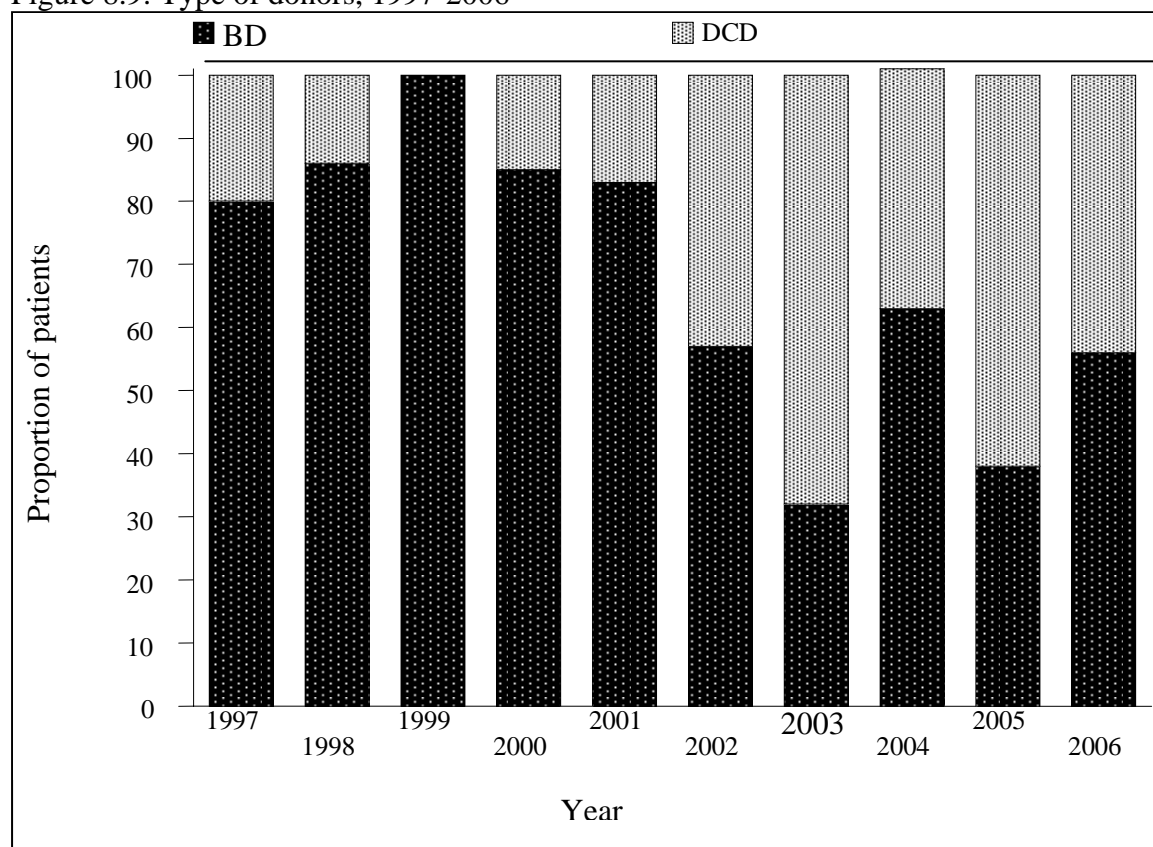


Table 8.10: Causes of death, 1997-2006

Causes of death	1997 N=5		1998 N=7		1999 N=4		2000 N=13		2001 N=24											
	Brain dead donors N=4	Cardiac death tissue donors N=1	Brain dead donors N=6	Cardiac death tissue donors N=1	Brain dead donors N=4	Cardiac death tissue donors N=0	Brain dead donors N=11	Cardiac death tissue donors N=2	Brain dead donors N=20	Cardiac death tissue donors N=4										
	No.	%	No.	%	No.	%	No.	%	No.	%										
Injury from MVA	1	25	0	0	5	83	0	0	3	75	0	0	5	45	2	100	11	55	0	0
Injury from fall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0	0
Injury from assault	0	0	0	0	1	17	0	0	0	0	0	0	0	0	0	0	1	5	0	0
Injury from industrial accident	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spontaneous hypertensive intracranial bleed	2	50	0	0	0	0	0	0	0	0	0	2	18	0	0	0	3	15	1	25
Spontaneous AVM/Aneurysm intracranial bleed	0	0	0	0	0	0	0	0	0	0	0	1	9	0	0	0	1	5	0	0
Brain anoxia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brain tumour	1	25	0	0	0	0	0	0	0	0	0	1	9	0	0	0	0	0	0	0
Thrombo embolic brain infarct	0	0	0	0	0	0	1	100	0	0	0	1	9	0	0	0	0	0	1	25
Cardiac disease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drowning	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	1	25
Unknown	0	0	1	100	0	0	0	0	1	25	0	0	1	9	0	0	2	10	1	25

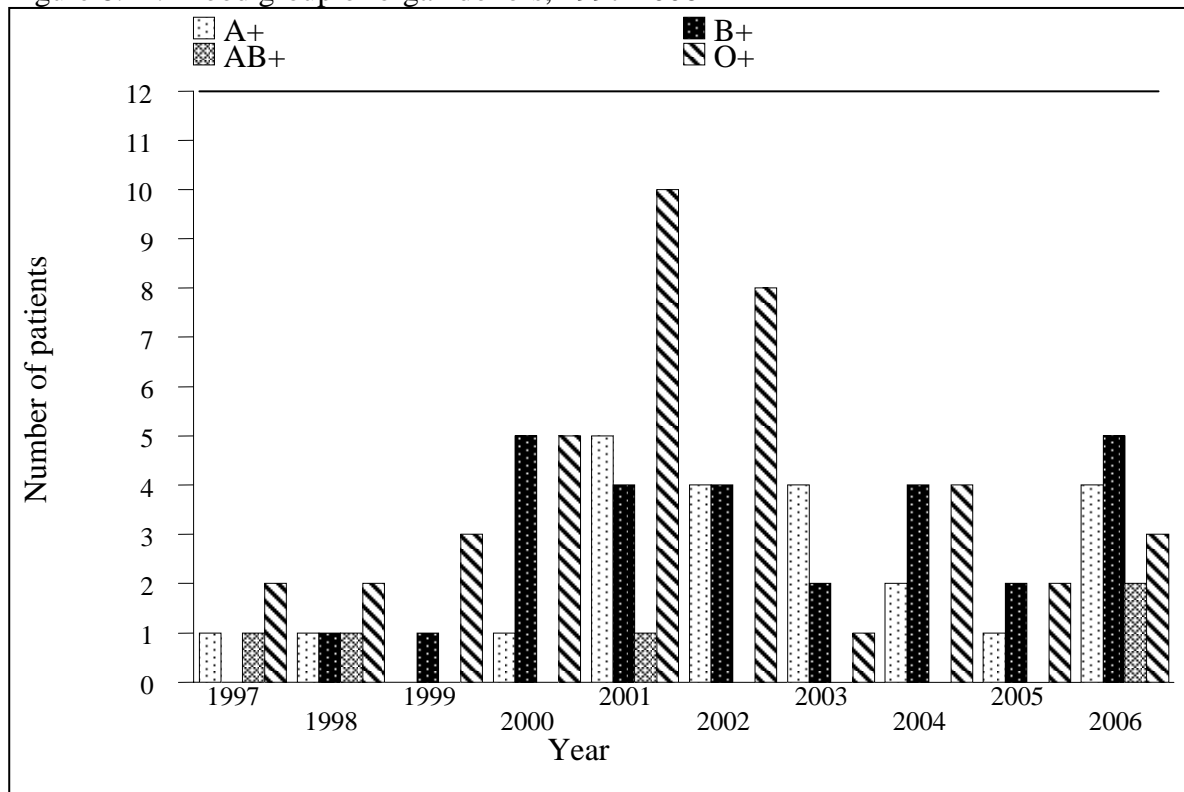
Causes of death	2002 N=30		2003 N=25		2004 N=16		2005 N=13		2006 N=25		Total N=162													
	Brain dead donors N=17		Cardiac death tissue donors N=17		Brain dead donors N=10		Cardiac death tissue donors N=6		Brain dead donors N=14		Cardiac death tissue donors N=11		Brain dead donors N=99		Cardiac death tissue donors N=63									
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%								
Injury from MVA	10	59	7	54	6	75	3	18	2	20	3	50	1	20	2	25	7	50	1	9	51	18	29	
Injury from fall	0	0	0	0	1	13	0	0	2	20	0	0	0	0	0	0	1	7	1	9	5	1	2	
Injury from assault	0	0	0	0	0	0	0	0	1	10	1	17	1	20	0	0	1	7	1	9	5	2	3	
Injury from industrial accident	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Spontaneous hypertensive intracranial bleed	1	6	0	0	0	0	1	6	1	10	2	33	1	20	0	0	1	7	0	0	11	4	6	
Spontaneous AVM/Aneurysm intracranial bleed	2	12	0	0	0	0	1	6	3	30	0	0	0	0	0	0	0	0	0	0	7	1	2	
Brain anoxia	1	6	0	0	0	0	1	6	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	
Brain tumour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	14	0	0	4	0	0	
Thrombo embolic brain infarct	1	6	0	0	1	13	0	0	0	0	0	0	1	20	0	0	0	0	0	2	4	4	6	
Cardiac disease	0	0	5	38	0	0	7	41	1	10	0	0	1	20	3	38	2	14	5	45	4	20	32	
Drowning	0	0	0	0	0	0	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	
Others	0	0	1	8	0	0	3	18	0	0	0	0	0	0	3	38	0	0	0	0	1	8	13	
Unknown	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	9	5	3	5	

Table 8.11: Organ Donors' Blood Group, 1997 – 2006

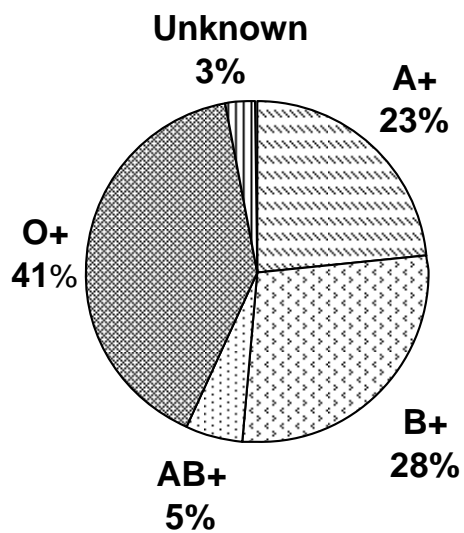
Blood group	No. (%)										
	1997 N=4	1998 N=6	1999 N=4	2000 N=11	2001 N=20	2002 N=17	2003 N=8	2004 N=10	2005 N=5	2006 N=14	Total N=99
A positive	1(25)	1(17)	0(0)	1(9)	5(25)	4(24)	4(50)	2(20)	1(20)	4(29)	23(23)
B positive	0(0)	1(17)	1(25)	5(45)	4(20)	4(24)	2(25)	4(40)	2(40)	5(36)	28(28)
AB positive	1(25)	1(17)	0(0)	0(0)	1(5)	0(0)	0(0)	0(0)	0(0)	2(14)	5(5)
O positive	2(50)	2(33)	3(75)	5(45)	10(50)	8(47)	1(13)	4(40)	2(40)	3(21)	40(41)
Unknown	0(0)	1(17)	0(0)	0(0)	0(0)	1(6)	1(13)	0(0)	0(0)	0(0)	3(3)

Blood group is only ascertained in brain dead donors and is not done for tissue donors post - cardiac deaths

Figure 8.11: Blood group of organ donors, 1997-2006



Blood group of organ donors 1997-2006



Blood group of organ donor 2006

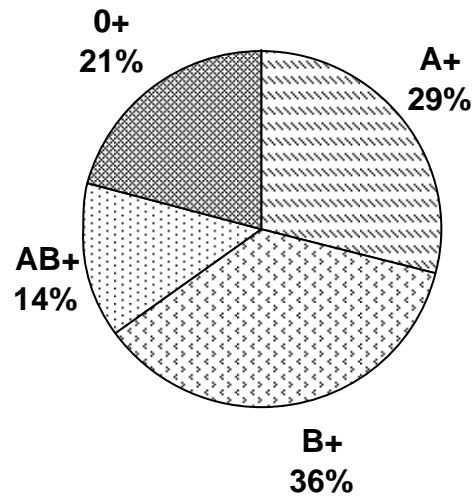


Table 8.12a: Institution where donor came from, 1997-2006

Institution where donor came from	1997 N=5		1998 N=7		1999 N=4		2000 N=13		2001 N=24	
	No.	%	No.	%	No.	%	No.	%	No.	%
MOH state/general hospitals	2	40	5	71	1	25	10	77	16	67
MOH district hospitals	0	0	0	0	0	0	2	15	0	0
University hospitals	1	20	1	14	0	0	0	0	6	25
Private hospitals	1	20	1	14	3	75	1	8	2	8
Home	1	20	0	0	0	0	0	0	0	0

Institution where donor came from	2002 N=30		2003 N=25		2004 N=16		2005 N=13		2006 N=25		Total N=162	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
MOH state/general hospitals	19	63	15	60	12	75	7	54	17	68	105	65
MOH district hospitals	2	7	4	16	2	13	0	0	1	4	10	6
University hospitals	4	13	3	12	1	6	1	8	3	12	20	12
Private hospitals	4	13	3	12	1	6	5	38	4	16	25	15
Home	1	3	0	0	0	0	0	0	0	0	2	1

Figure 8.12a: Institution where donor came from, 1997-2006

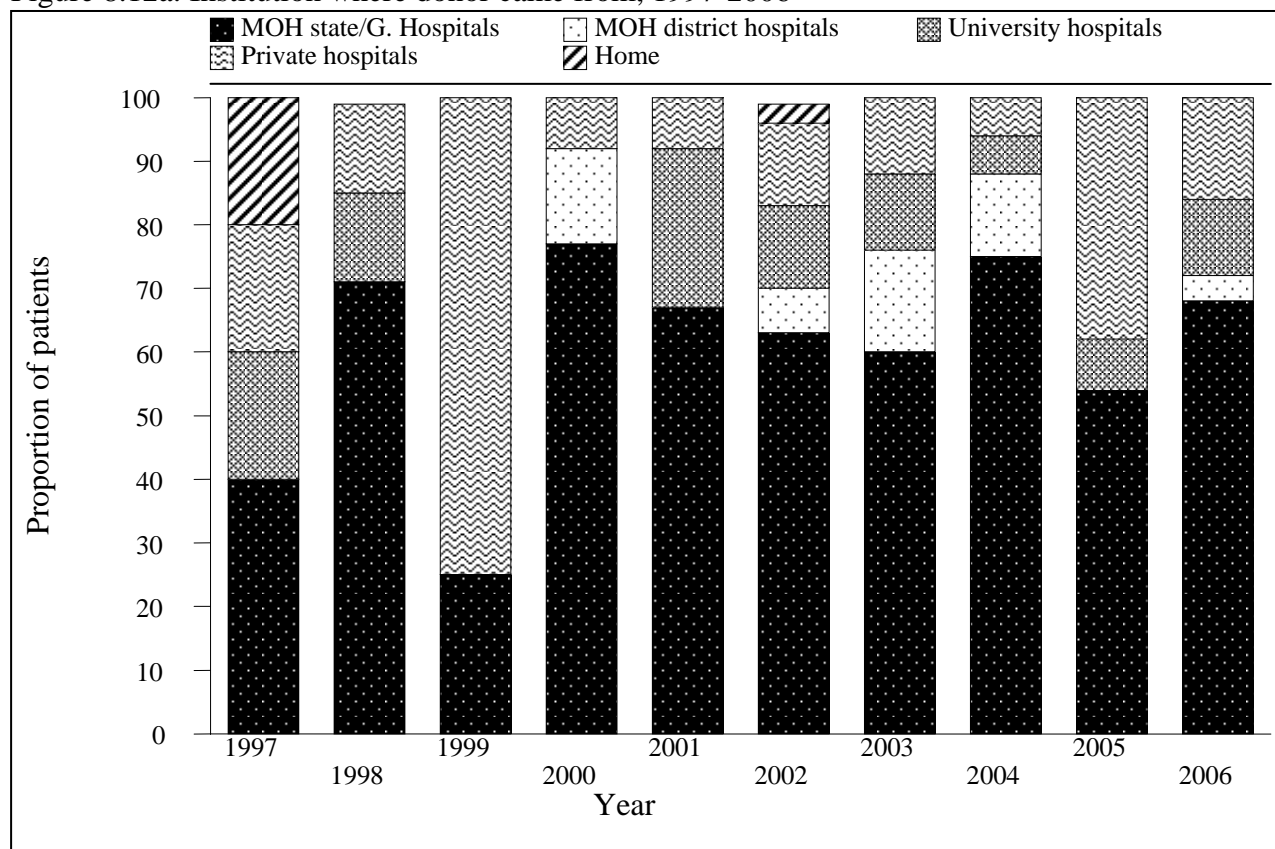


Table 8.12b: Location where donor was referred from, 1997-2006

Location where donor was referred from	1997 N=5		1998 N=7		1999 N=4		2000 N=13		2001 N=24	
	No.	%	No.	%	No.	%	No.	%	No.	%
ICU	1	20	0	0	0	0	1	8	14	58
Ward	0	0	0	0	0	0	0	0	0	0
Emergency department	0	0	0	0	0	0	0	0	3	13
Mortuary	0	0	0	0	0	0	0	0	0	0
Home	0	0	0	0	0	0	0	0	0	0
Data not available	4	80	7	100	4	100	12	92	7	29

Location where donor was referred from	2002 N=30		2003 N=25		2004 N=16		2005 N=13		2006 N=25		Total N=162	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
ICU	16	53	13	52	12	75	8	62	16	64	81	50
Ward	1	3	3	12	1	6	3	23	3	12	11	7
Emergency department	4	13	1	4	0	0	0	0	3	12	11	7
Mortuary	3	10	6	24	3	19	1	8	3	12	16	10
Home	1	3	0	0	0	0	0	0	0	0	1	1
Data not available	5	17	2	8	0	0	1	8	0	0	42	26

Figure 8.12b: Location where donor was referred from, 1997-2006

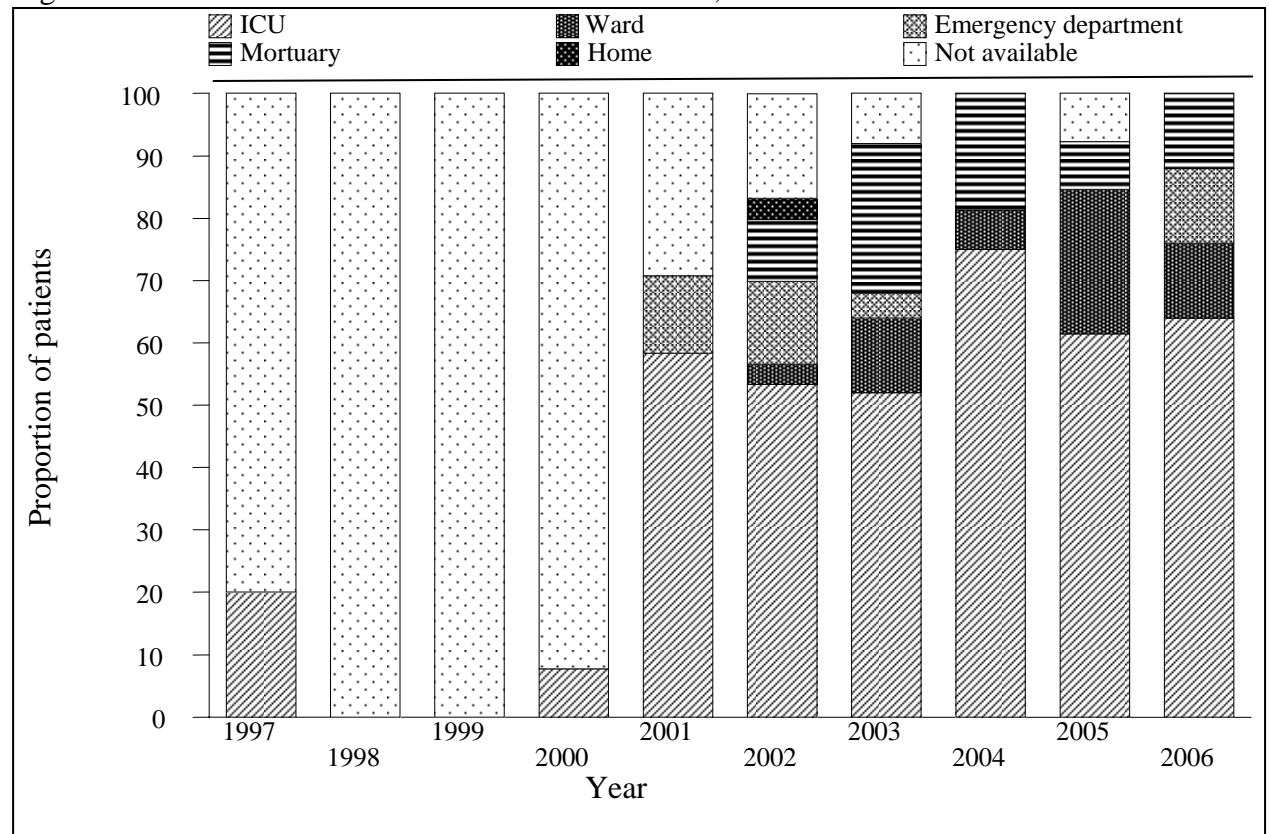


Table 8.12c: Location where procurement was carried out, 1997-2006

Location where procurement was carried out	1997 N=5		1998 N=7		1999 N=4		2000 N=13		2001 N=24	
	No.	%	No.	%	No.	%	No.	%	No.	%
Operation theatre	4	80	6	86	4	100	11	85	20	83
Mortuary	0	0	1	14	0	0	2	15	3	13
Ward	0	0	0	0	0	0	0	0	1	4
Home	1	20	0	0	0	0	0	0	0	0
Data not available	0	0	0	0	0	0	0	0	0	0

Location where procurement was carried out	2002 N=30		2003 N=25		2004 N=16		2005 N=13		2006 N=25		Total N=162	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Operation theatre	14	47	8	32	9	56	5	38	14	56	95	69
Mortuary	14	47	14	56	7	44	5	38	10	40	56	35
Ward	1	3	3	12	0	0	2	15	1	4	8	5
Home	1	3	0	0	0	0	0	0	0	0	2	1
Data not available	0	0	0	0	0	0	1	8	0	0	1	1

Figure 8.12c: Location where procurement was carried out, 1997-2006

