CHAPTER 5

RENAL TRANSPLANTATION

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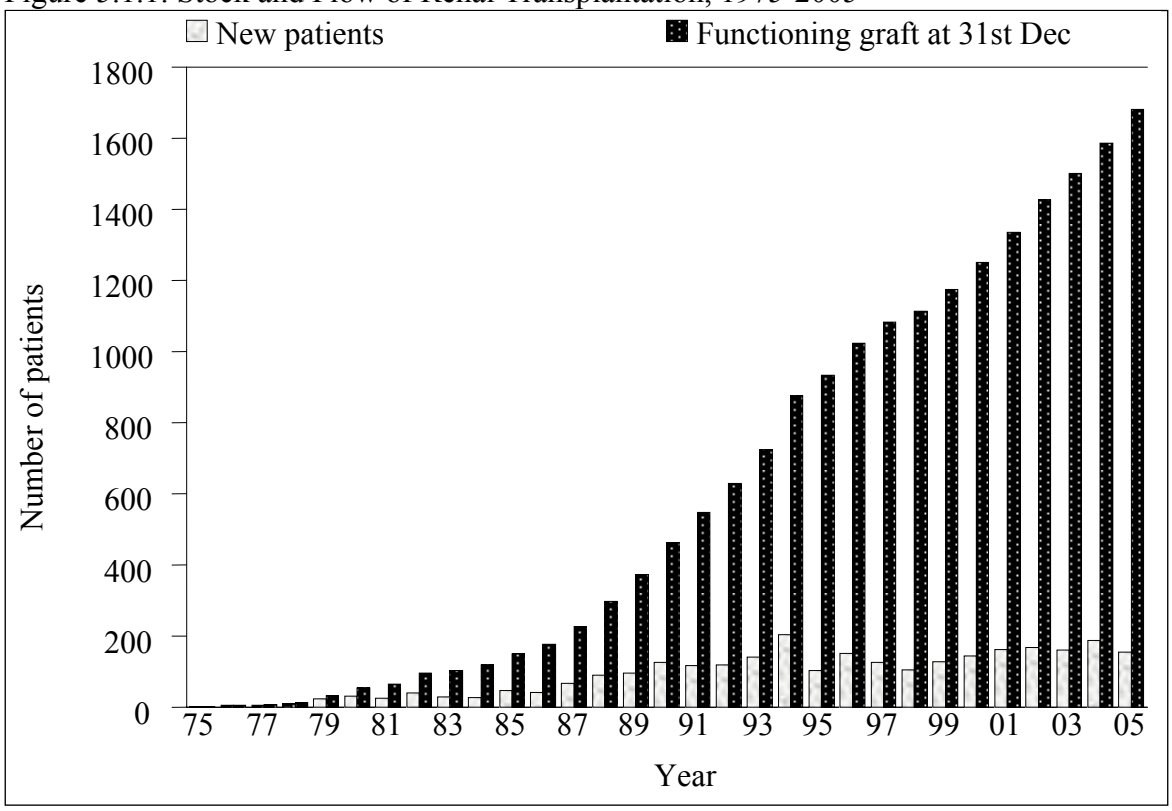
5.1 STOCK AND FLOW

New renal transplant patients showed a modest increase from 151 transplants per year in 1996 to 187 per year in 2004. By 2005, the number of functioning renal transplants has increased to 1681 (Table 5.1.1).

Table 5.1.1: Stock and Flow of Renal Transplantation, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
New transplant patients	151	126	104	127	143	161	168	160	187	155
Died	31	29	23	25	27	35	31	36	37	38
Graft failure	28	38	48	36	32	40	38	41	44	15
Lost to follow up	1	0	2	4	9	2	7	9	21	6
Functioning graft at 31st December	1023	1082	1113	1175	1250	1334	1426	1500	1585	1681

Figure 5.1.1: Stock and Flow of Renal Transplantation, 1975-2005



Incident rate for renal transplantation stabilised at a modest rate of 5-7 per million population for the last decade (Table 5.1.2), while the transplant prevalence rate maintained at 48-69 per million population for the last 10 years (Table 5.1.3).

Table 5.1.2: New transplant rate per million population (pmp), 1996-2005

Year	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
New transplant patients	151	126	104	127	143	161	168	160	187	155
New transplant rate, pmp	7	6	5	6	6	7	7	6	7	6

Figure 5.1.2: New transplant rate, 1996-2005

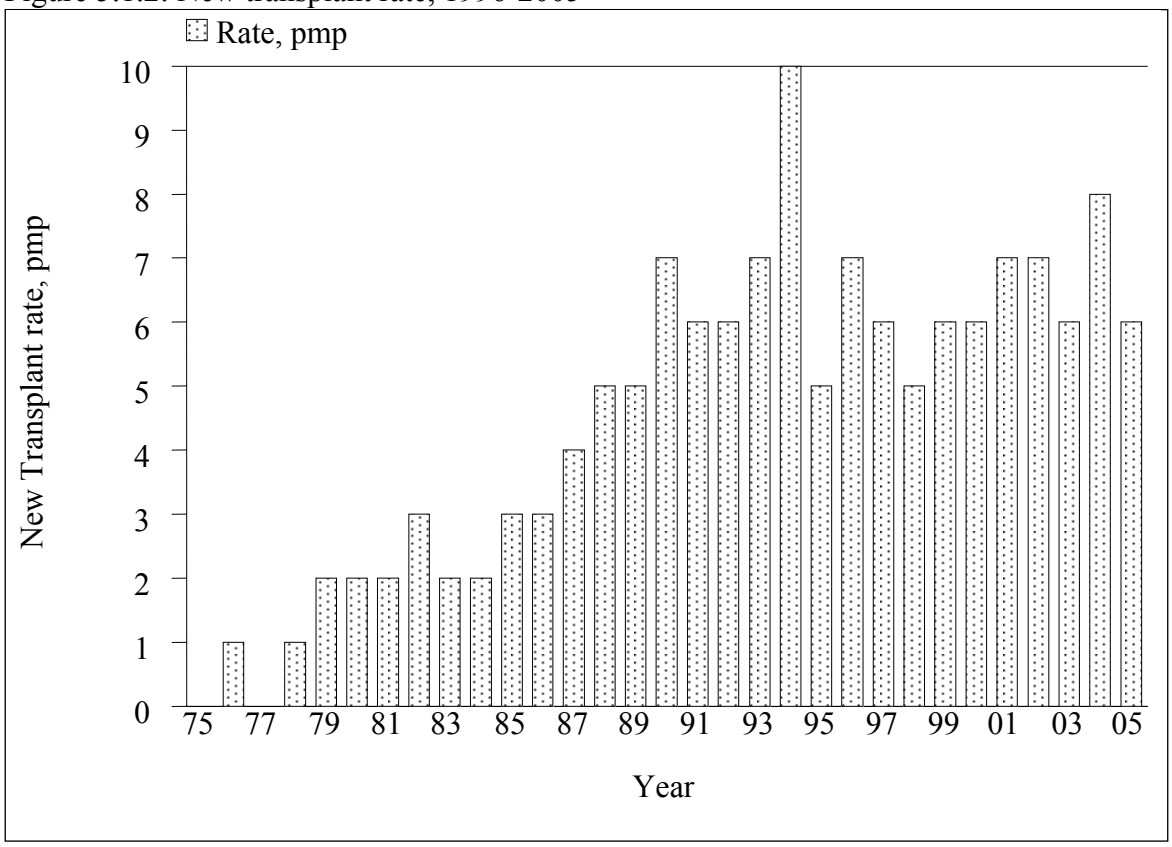


Table 5.1.3: Transplant prevalence rate per million population (pmp), 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Functioning graft at 31st December	1023	1082	1113	1175	1250	1334	1426	1500	1585	1678
Transplant prevalence rate, pmp	48	50	50	52	53	56	58	60	66	69

Figure 5.1.3: Transplant prevalence rate, 1996-2005

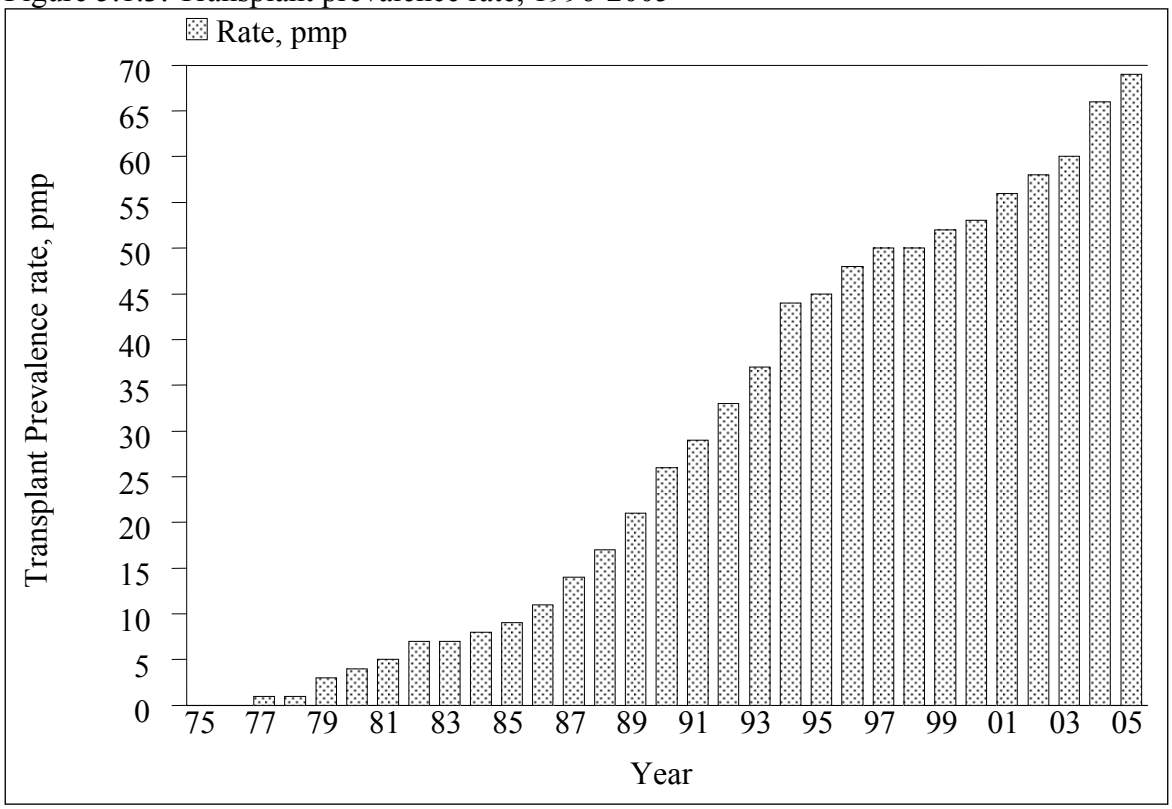


Table 5.1.4: Place of transplantation, 1996-2005

Year	1996		1997		1998		1999		2000		2001	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
HKL	32	21	29	23	33	32	36	28	28	20	33	20
UMMC	7	5	6	5	7	7	16	13	19	13	23	14
Selayang Hospital	0	0	0	0	0	0	0	0	4	3	11	7
Other local	0	0	0	0	0	0	1	1	3	2	4	2
China	105	70	79	63	50	48	61	48	80	56	82	51
India	6	4	7	6	7	7	5	4	9	6	7	4
Other overseas	1	1	3	2	3	3	2	2	0	0	1	1
Unknown	0	0	2	2	4	4	6	5	0	0	0	0
TOTAL	151	100	126	100	104	100	127	100	143	100	161	100

Year	2002		2003		2004		2005		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
HKL	28	17	26	16	20	11	30	19	295	20
UMMC	14	8	6	4	7	4	6	4	111	7
Selayang Hospital	11	7	11	7	11	6	5	3	53	4
Other local	1	1	1	1	2	1	5	3	17	1
China	102	61	111	69	134	72	104	67	909	61
India	12	7	4	3	11	6	5	3	73	5
Other overseas	0	0	1	1	2	1	0	0	13	1
Unknown	0	0	0	0	0	0	0	0	11	1
TOTAL	168	100	160	100	187	100	155	100	1482	100

5.2 RECIPIENTS' CHARACTERISTICS

The mean age for new transplant recipients is between 36±6 years to 42±13 years over the last 10 years (Table 5.2.1). Men are still in the majority among renal transplant recipients and they made up 70% of all recipients in year 2005. Over the last 10 years, the proportion of diabetic transplant recipients has increased, from 9% in 1996 to about 20% for the last 3 years.

In 2005, 3% were HbsAg positive and 2% had anti-HCV antibodies at the time of transplantation. The proportion of HbsAg positivity had reduced from 10-20% in the period 1985-1994 to 3-7% for the last 5 years while the number of recipients with anti-HCV antibodies at the time of transplantation had also reduced from 20-30% in the early 1990's to 2-15% for the last 5 years since the screening test was introduced in 1989. For those transplanted prior to the screening test, anti-HCV antibodies were found in 40-60%.

Table 5.2.1: Renal Transplant Recipients' Characteristics, 1996-2005

Year	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
New Transplant Patients	151	126	104	127	143	161	168	160	187	155
Age at transplant (years), Mean	39	36	37	37	40	41	41	42	41	38
Age at transplant (years), SD	11	12	11	13	13	13	13	13	13	14
% Male	57	63	58	61	64	63	57	66	62	70
% Diabetic (co-morbid / primary renal disease)	9	11	9	10	15	19	15	22	21	19
% HBsAg positive	13	6	6	4	5	4	7	8	6	3
% Anti-HCV positive	20	7	18	11	8	15	9	10	8	2

Chronic glomerulonephritis was the primary cause of ESRF in 25-34% for the last 5 years (Table 5.2.2). As expected, patients with diabetes mellitus had become increasingly frequent renal transplant recipients, from 7% in 1996 to 17% in 2005. Majority of renal transplant recipients still presented late with unknown primary renal disease, contributing to 29-50% of all the recipients for the last decade.

Table 5.2.2: Primary causes of end stage renal failure, 1996-2005

Year	**1996**		**1997**		**1998**		**1999**		**2000**	
	No.	%	No.	%	No.	%	No.	%	No.	%
New transplant patients	151	100	126	100	104	100	127	100	143	100
Glomerulonephritis	48	32	30	24	28	27	41	32	49	34
Diabetes Mellitus	10	7	9	7	5	5	10	8	16	11
Hypertension	8	5	4	3	5	5	7	6	18	13
Obstructive uropathy	2	1	3	2	4	4	4	3	3	2
ADPKD	4	3	2	2	1	1	1	1	3	2
Drugs/toxic nephropathy	0	0	0	0	0	0	0	0	0	0
Hereditary nephritis	0	0	0	0	0	0	0	0	0	0
Unknown	76	50	64	51	55	53	62	49	54	38
Others	11	7	18	14	10	10	6	5	12	8

Year	**2001**		**2002**		**2003**		**2004**		**2005**	
	No.	%	No.	%	No.	%	No.	%	No.	%
New transplant patients	161	100	168	100	160	100	187	100	155	100
Glomerulonephritis	41	25	53	32	54	34	62	33	45	29
Diabetes Mellitus	23	14	16	10	26	16	31	17	27	17
Hypertension	17	11	24	14	25	16	50	27	37	24
Obstructive uropathy	3	2	2	1	2	1	3	2	2	1
ADPKD	1	1	3	2	5	3	4	2	3	2
Drugs/toxic nephropathy	0	0	0	0	2	1	2	1	0	0
Hereditary nephritis	0	0	0	0	0	0	1	1	0	0
Unknown	61	38	68	40	58	36	82	44	47	30
Others	22	14	15	9	12	8	27	14	15	10

5.3 TRANSPLANT PRACTICES

In 2005, commercial transplants from China constituted 65% of all new renal transplantation, while live donor transplantation made up 25% and local cadaveric transplants contributed only 5% of all new renal transplantation (Table 5.3.1).

Table 5.3.1: Type of Renal Transplantation, 1996-2005

Year	**1996**		**1997**		**1998**		**1999**		**2000**	
	No.	%	No.	%	No.	%	No.	%	No.	%
Commercial Cadaver	106	72	80	66	51	52	62	51	80	56
Commercial Live Donor	4	3	7	6	4	4	4	3	9	6
Live Donor (genetically related)	36	24	27	22	27	27	40	33	21	15
Live Donor (emotionally related)	0	0	0	0	2	2	5	4	6	4
Cadaver	2	1	8	7	15	15	10	8	27	19
Total	148	100	122	100	99	100	121	99	143	100

Year	**2001**		**2002**		**2003**		**2004**		**2005**	
	No.	%	No.	%	No.	%	No.	%	No.	%
Commercial Cadaver	82	51	102	61	112	70	139	76	101	65
Commercial Live Donor	6	4	11	7	3	2	5	3	8	5
Live Donor (genetically related)	32	20	30	18	25	16	21	11	35	23
Live Donor (emotionally related)	4	2	3	2	5	3	2	1	3	2
Cadaver	37	23	22	13	15	9	17	9	8	5
Total	161	100	168	100	160	100	184	100	155	100

*Commercial Cadaver (China, India, other oversea) *Commercial live donor (living unrelated) *Cadaver (local)

Table 5.3.2: Biochemical data, 2004-2005

Biochemical parameters	Summary	2004	2005
Creatinine, umol/L	N	1550	1633
	Mean	132	133.6
	SD	63.8	65.5
	Median	120	120
	Minimum	38	35
	Maximum	817	763
Hb, g/dL	N	1550	1633
	Mean	12.9	12.9
	SD	1.9	1.9
	Median	12.9	12.9
	Minimum	4.9	5.5
	Maximum	19.7	20.6
Albumin, g/L	N	1550	1633
	Mean	39.3	39.3
	SD	1	0.5
	Median	39.3	39.3
	Minimum	22	34
	Maximum	50	46
Calcium, mmol/L	N	1550	1633
	Mean	2.4	2.3
	SD	0.2	0.2
	Median	2.3	2.3
	Minimum	1.1	1.2
	Maximum	3.3	3.3
Phosphate, mmol/L	N	1550	1633
	Mean	1.1	1.1
	SD	0.2	0.2
	Median	1.1	1.1
	Minimum	0.3	0.3
	Maximum	2.7	3.3
Alkaline Phosphatase (ALP), U/L	N	1550	1633
	Mean	79.5	78.9
	SD	46.5	46.5
	Median	73	73
	Minimum	10	18
	Maximum	994	831
Alanine Transferase (ALT), U/L	N	1550	1633
	Mean	31.5	30.6
	SD	32.6	29.8
	Median	25	24
	Minimum	4	4
	Maximum	563	613
Total cholesterol, mmol/L	N	1550	1633
	Mean	5.5	5.4
	SD	1.1	1
	Median	5.4	5.4
	Minimum	2.6	2.1
	Maximum	20	13.1
LDL cholesterol, mmol/L	N	1550	1633
	Mean	3.1	3
	SD	0.7	0.8
	Median	3.1	3.1
	Minimum	1	0.9
	Maximum	8.5	9.2
HDL cholesterol, mmol/L	N	1550	1633
	Mean	1.6	1.6
	SD	0.4	0.5
	Median	1.6	1.6
	Minimum	0.2	0.2

Biochemical parameters	Summary	2004	2005
	Maximum	4.3	5.6
Systolic Blood Pressure, mmHg	N	1550	1633
	Mean	132.3	133.4
	SD	15.9	16.9
	Median	130	130
	Minimum	80	80
	Maximum	200	220
Diastolic Blood Pressure, mmHg	N	1550	1633
	Mean	80.3	80.6
	SD	9.6	9.2
	Median	80	80
	Minimum	40	50
	Maximum	121	127

Cyclosporine/prednisolone based triple therapy has remained the backbone of maintenance immunosuppressive therapy. In year 2005, 78% of renal transplant recipients were on CsA while 98% were on prednisolone. Only 14% were on tacrolimus. However, 44% of the recipients were on MMF as opposed to 39% on azathioprine.

Table 5.3.3: Medication data, 2004-2005

Medication data	**Single drug treatment**				**Combined drug treatment**			
	2004		**2005**		**2004**		**2005**	
	N	%	N	%	N	%	N	%
All patients	1416	100	1557	100	1416	100	1557	100
(i) Immunosuppressive drug(s) treatment								
Prednisolone	13	1	12	1	1394	98	1524	98
Azathioprine	0	0	1	0	603	43	605	39
Cyclosporin A	4	0	4	0	1135	80	1219	78
Tacrolimus (FK506)	0	0	0	0	185	13	221	14
Mycophenolate Mofetil (MMF)	1	0	0	0	524	37	679	44
Rapamycin	0	0	0	0	5	0	8	1
Others	1	0	0	0	16	1	10	1
(ii) Non-Immunosuppressive drug(s) treatment								
Beta blocker	104	7	105	7	650	46	665	43
Calcium channel blocker	188	13	195	13	795	56	820	53
ACE inhibitor	35	2	60	4	272	19	342	22
AIIRB	11	1	19	1	76	5	159	10
Anti-lipid	73	5	66	4	566	40	600	39
Other anti-hypertensive	5	0	5	0	130	9	157	10

Sixty-four percent of the recipients had hypertension as a co-morbidity before transplantation while another 27% developed hypertension post transplantation (Table 5.4.1). Among these patients, only 29% were on monotherapy while the rest were on multiple drug treatment. For those on combination therapy, majority was on calcium channel blockers (53%) and beta blockers (43%). Only 22% were on ACE inhibitors while another 10% were on AIIRBs.

5.4 TRANSPLANT OUTCOMES

5.4.1 Post-transplant complications

Table 5.4.1: Post transplant complications, 2004-2005

Post transplant complications	Complication developed before transplant (regardless of complication after transplantation)				Complication developed only after transplantation			
	2004		**2005**		**2004**		**2005**	
	N	%	N	%	N	%	N	%
All patients	1550	100	1633	100	1550	100	1633	100
Diabetes (either as Primary Renal Disease or co-morbid)	356	23	368	23	126	8	123	8
Cancer	3	0	2	0	17	1	19	1
Cardiovascular disease + cerebrovascular disorder	147	9	148	9	83	5	45	3
Hypertension	1003	65	1042	64	397	26	440	27

* Hypertension: BP systolic > 140 and BP diastolic >90
OR have either Beta blocker / Calcium channel blocker / ACE inhibitor / AIIRB / Other anti-hypertensive

It is also interesting to note while 23% of the prevalent renal transplant recipients had diabetes mellitus before transplantation (either as primary renal disease or co-morbidity), another 8% of them developed diabetes mellitus post transplantation (PTDM).

5.4.2 Deaths and Graft loss

In 2005, 38 (2%) of transplant recipients died and 15 (1%) lost their grafts. These rates of transplant death and graft loss have remained constant for the last 10 years (Table 5.4.2). Infection, cardiovascular disease and death at home were among the commonest causes of death for the last decade and in 2005, they accounted for 42%, 11% and 11% of the causes of death respectively (Table 5.4.3). However, death secondary to cancer has become more common over the last 5 years and in 2004, cancer death accounted for 17% of all causes of death. Renal allograft rejection accounted for 50-60% of graft losses for the last 10 years (Table 5.4.4).

Table 5.4.2: Transplant Patients Death Rate and Graft Loss, 1996-2005

Year	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
No. at risk	978	1053	1098	1144	1213	1292	1380	1463	1543	1633
Transplant death	31	29	23	25	27	35	31	36	37	38
Transplant death rate %	3	3	2	2	2	3	2	2	2	2
Graft loss	28	38	48	36	32	40	38	41	44	15
Graft loss rate %	3	4	4	3	3	3	3	3	3	1
Acute rejection	0	0	0	0	0	0	0	3	18	14
Acute rejection rate %	0	0	0	0	0	0	0	0	1	1
All losses	59	67	71	61	59	75	69	80	99	67
All losses rate %	6	6	6	5	5	6	5	5	6	4

*Graft loss=graft failure

*All losses=death / graft loss (acute rejection happens concurrently with graft failure/ death)

Figure 5.4.2(i): Transplant Recipient Death Rate, 1975-2005

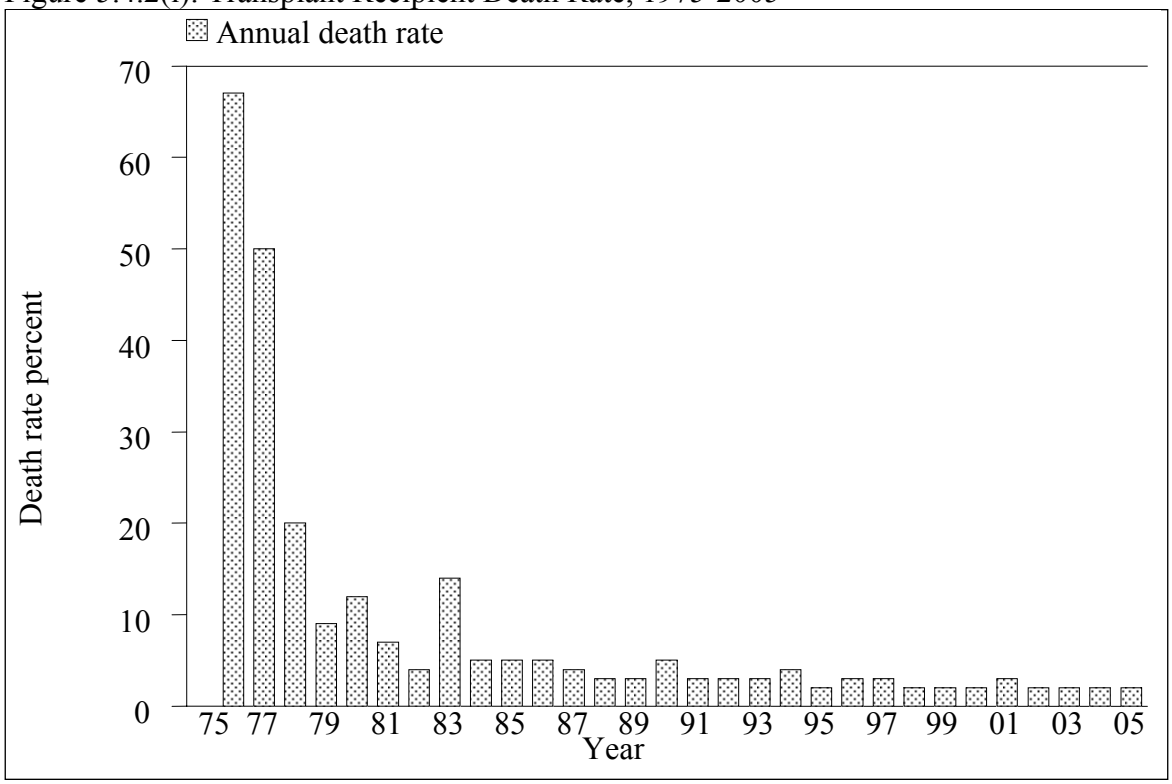


Figure 5.4.2(ii): Transplant Recipient Graft Loss Rate, 1975-2005

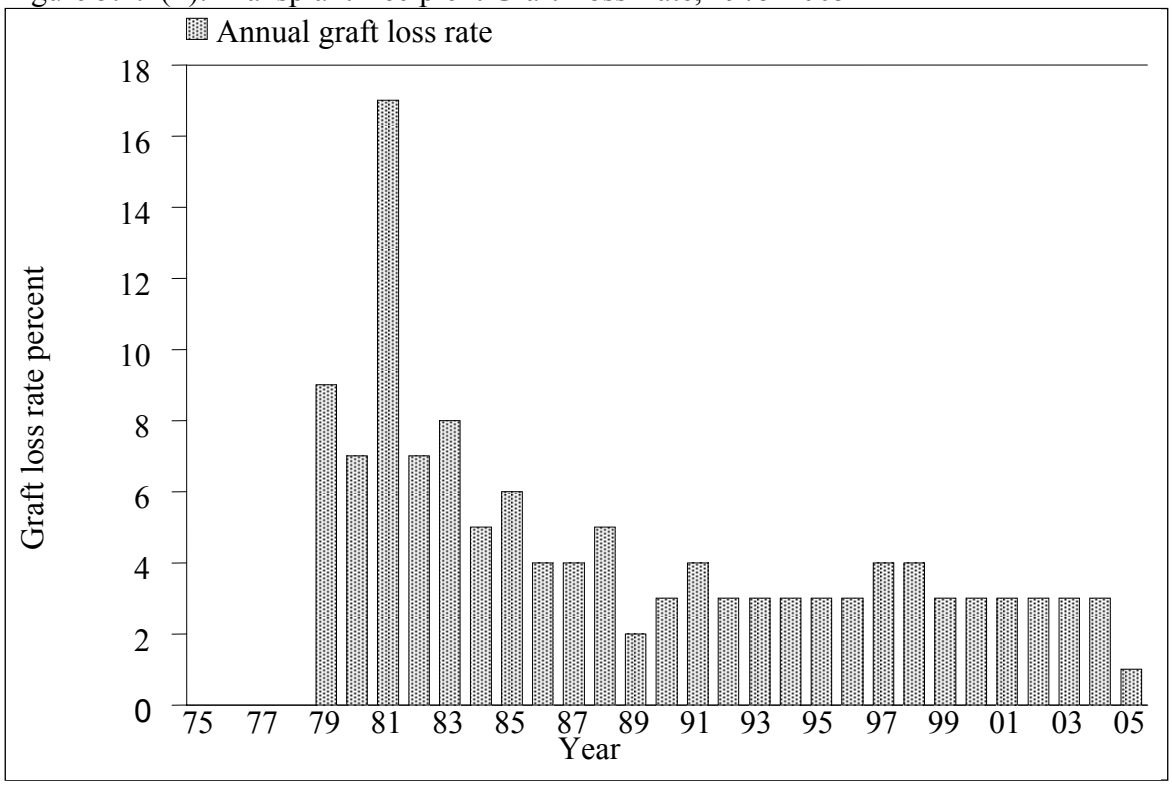


Table 5.4.3: Causes of Death in Transplant Recipients, 1996-2005

Year	1996		1997		1998		1999		2000		2001		2002		2003		2004		2005	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Cardiovascular	4	13	3	10	3	13	4	13	10	32	6	15	5	16	9	23	3	7	4	11
Died at home	3	9	2	7	4	17	6	19	1	3	5	12	5	16	5	13	6	15	4	11
Infection	18	56	14	48	9	38	7	23	11	35	19	46	9	29	10	26	9	22	16	42
Graft failure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cancer	2	6	0	0	3	13	3	10	2	6	6	15	4	13	6	15	7	17	2	5
Liver disease	3	9	2	7	2	8	3	10	1	3	1	2	3	10	2	5	3	7	3	8
Accidental death	0	0	0	0	0	0	1	3	1	3	1	2	1	3	0	0	0	0	0	0
Others	1	3	4	14	0	0	5	16	3	10	2	5	2	6	5	13	9	22	3	8
Unknown	1	3	4	14	3	13	2	6	2	6	1	2	2	6	2	5	4	10	6	16
TOTAL	32	100	29	100	24	100	31	100	31	100	41	100	31	100	39	100	41	100	38	100

Table 5.4.4: Causes of Graft Failure, 1996-2005

Year	1996		1997		1998		1999		2000		2001		2002		2003		2004		2005	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Rejection	14	50	21	54	27	52	23	64	19	59	25	61	22	55	22	50	33	70	18	78
Calcineurin toxicity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other drug toxicity	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0
Ureteric obstruction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Infection	0	0	0	0	1	2	0	0	1	3	2	5	0	0	2	5	1	2	1	4
Vascular causes	1	4	4	10	3	6	1	3	3	9	1	2	0	0	3	7	4	9	2	9
Recurrent/de novo renal disease	2	7	1	3	1	2	0	0	0	0	2	5	2	5	1	2	1	2	0	0
Others	0	0	5	13	5	10	0	0	2	6	0	0	4	10	1	2	0	0	1	4
Unknown	11	39	7	18	15	29	12	33	7	22	11	27	12	30	15	34	7	15	1	4
TOTAL	28	100	39	100	52	100	36	100	32	100	41	100	40	100	44	100	47	100	23	100

5.4.3 Patient and Graft Survival

The overall transplant patient survival rate from 1993 to 2005 was 95%, 92%, 89% and 81% at 1 year, 3 years, 5 years and 10 years respectively, while the overall graft survival rate was 92%, 85%, 79% and 63% respectively.

Table 5.4.5: Patient survival, 1993-2005

Interval (years)	No.	% Survival	SE
1	1621	95	1
3	1209	92	1
5	849	89	1
10	258	81	1

* No.=Number at risk SE=standard error

Figure 5.4.5: Patient survival, 1993-2005

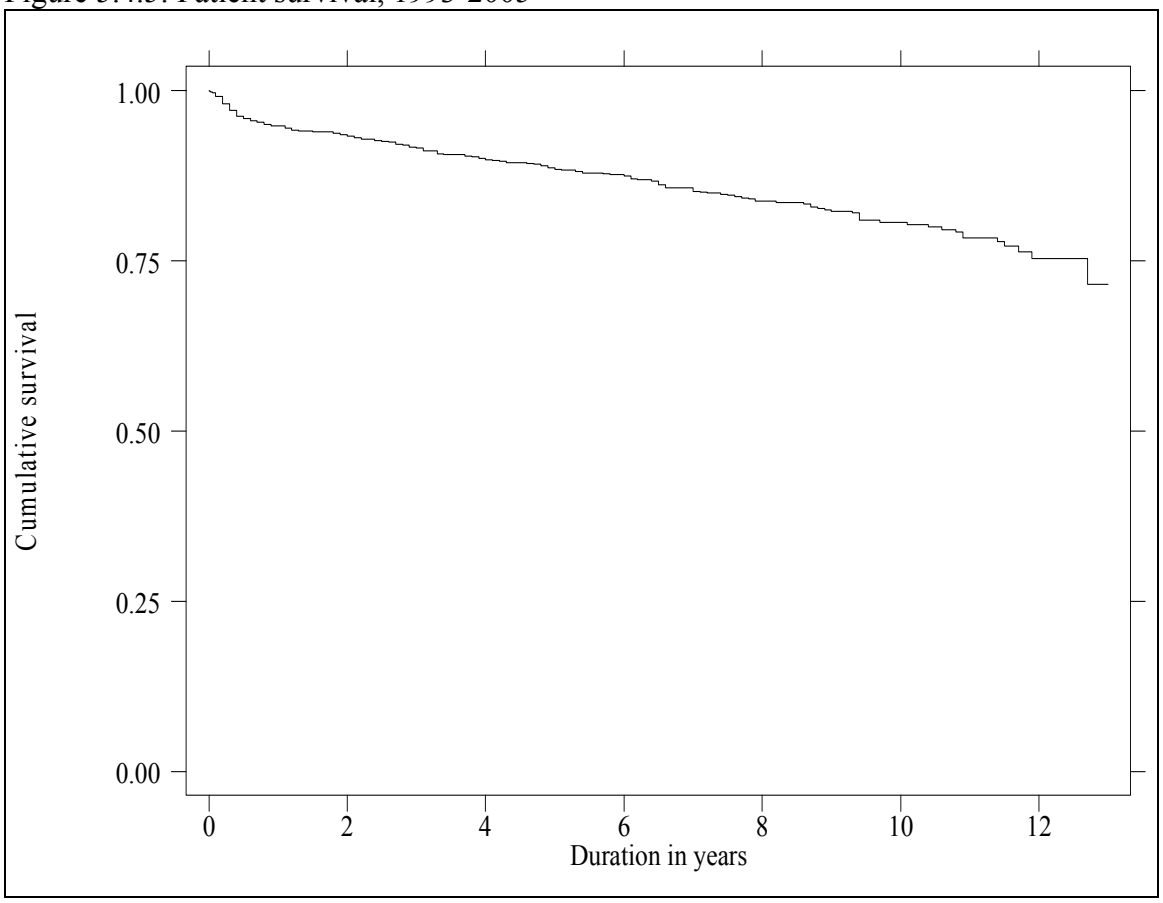
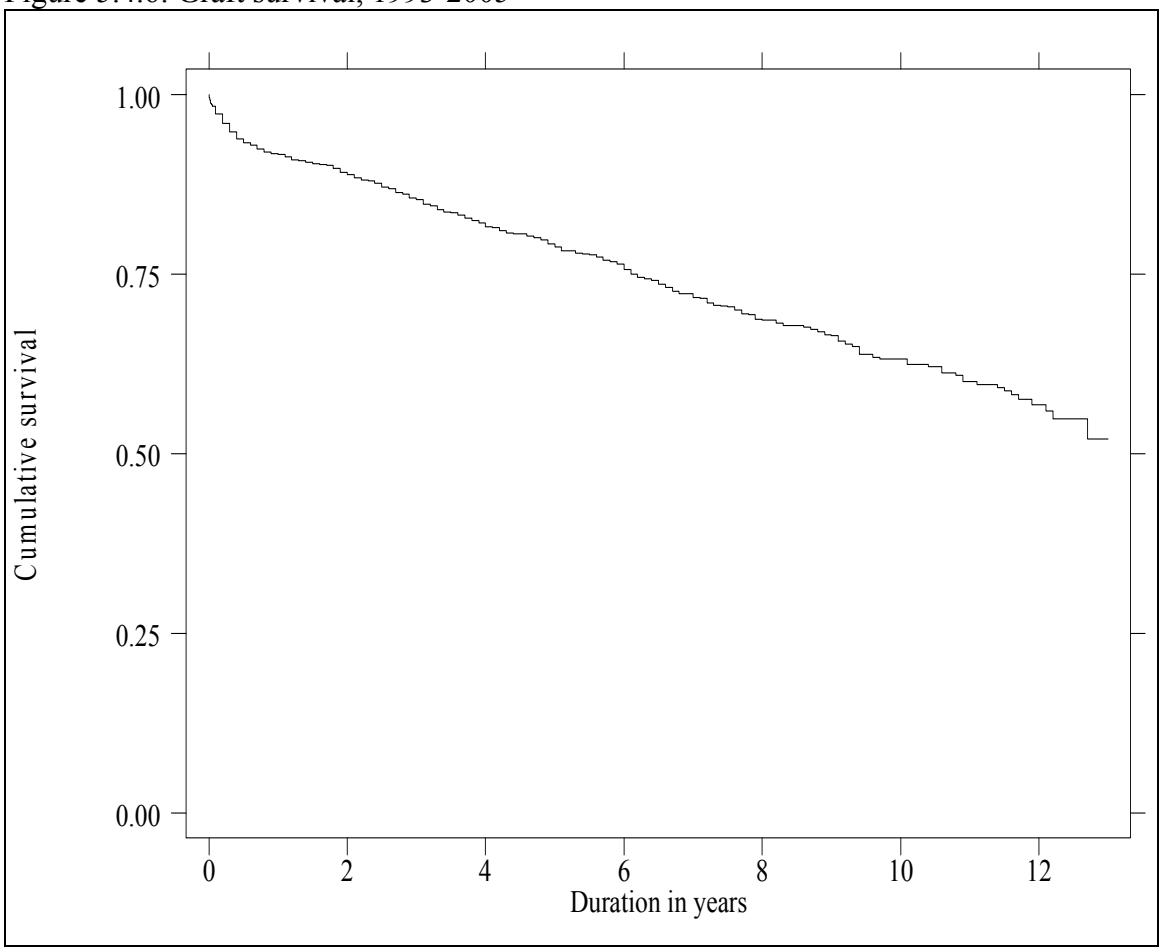


Table 5.4.6: Graft survival, 1993-2005

Interval (years)	No.	% survival	SE
1	1616	92	1
3	1208	85	1
5	848	79	1
10	257	63	1

* No.=Number at risk SE=standard error

Figure 5.4.6: Graft survival, 1993-2005



Outcomes of renal transplantation from the four donor groups are shown in Figures 5.4.7 and 5.4.8 and demonstrate substantially different patient and graft survival rates. Living donor grafts maintained the best patient and graft survival rates. The 1, 3, 5 and 10 year patient survival rate for recipients of living donor grafts were 96%, 95%, 94% and 89% respectively. The graft survival rates also differed between these 4 groups; living and commercial cadaver donor graft had the best outcomes.

Table 5.4.7: Patient survival by type of transplant, 1993-2005

Type of Transplant	Commercial Cadaver			Commercial Live Donor			Live Donor			Cadaver		
Interval (years)	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE
1	831	96	1	278	96	1	362	96	1	121	84	1
3	565	93	1	238	91	1	298	95	1	88	79	1
5	363	89	1	200	87	1	219	94	1	50	75	1
10	54	85	1	125	73	1	74	89	1	3	69	1

* No.=Number at risk SE=standard error

Figure 5.4.7: Patient survival by type of transplant, 1993-2005

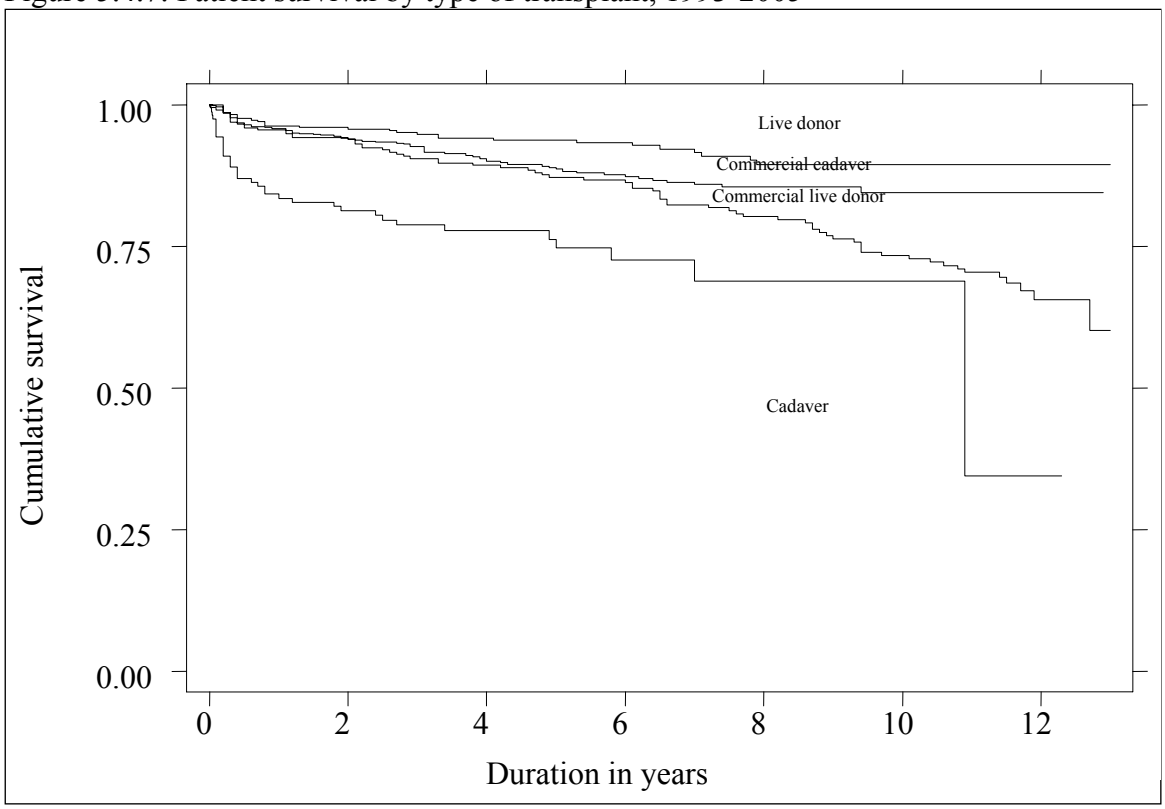
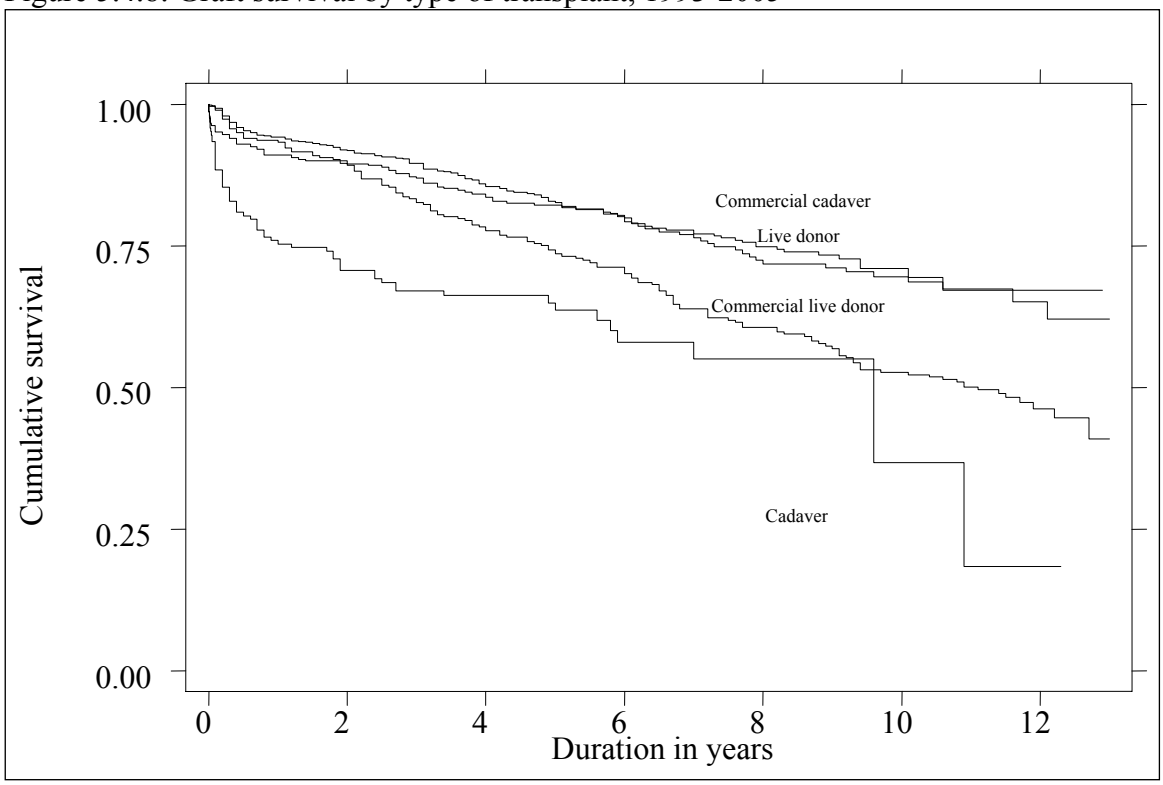


Table 5.4.8: Graft survival by type of transplant, 1993-2005

Type of Transplant	Commercial Cadaver			Commercial Live Donor			Live Donor			Cadaver		
Interval (years)	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE
1	831	94	1	278	93	1	362	91	1	121	75	1
3	565	90	1	238	83	1	298	87	1	88	67	1
5	363	83	1	200	74	1	219	82	1	50	64	1
10	54	71	1	125	53	1	74	70	1	3	37	1

* No.=Number at risk SE=standard error

Figure 5.4.8: Graft survival by type of transplant, 1993-2005



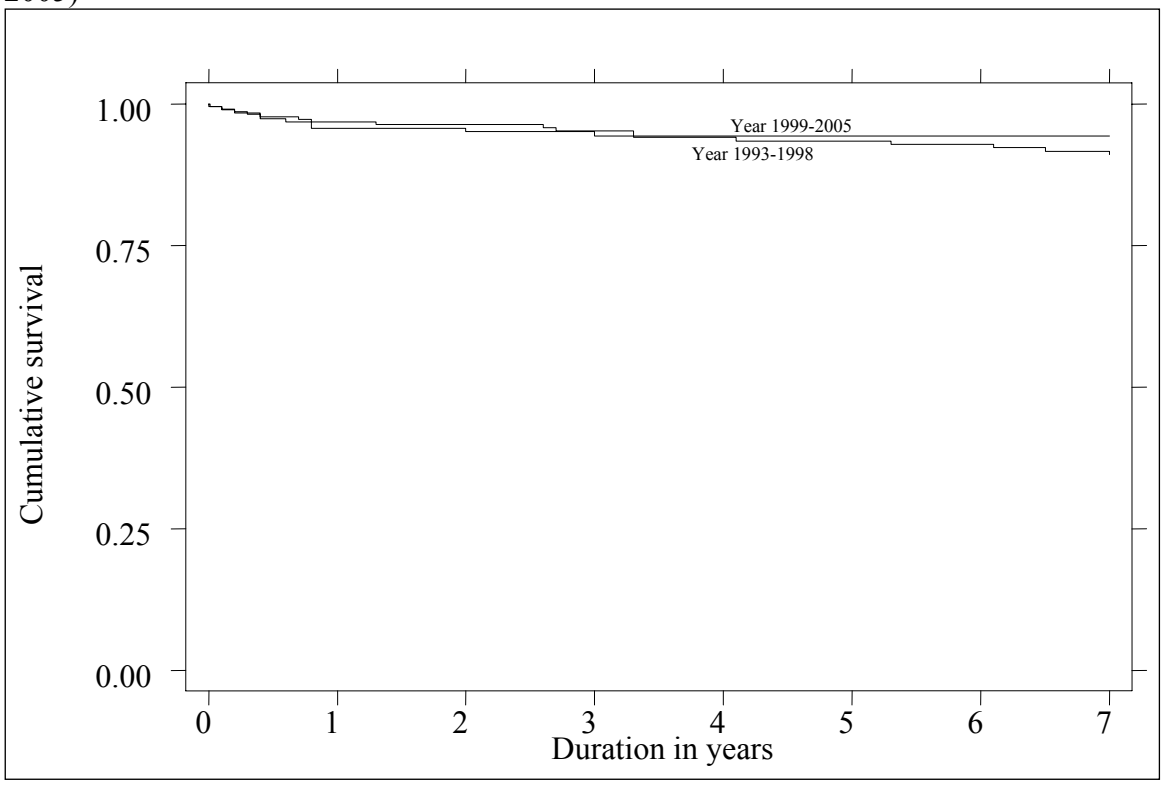
The patient and graft survival rates for 1993-1998 cohort and 1999-2005 cohort were compared. Patient survival rate for living related donor renal transplants has remained excellent and unchanged for these two cohorts (Figure 5.4.9).

Table 5.4.9: Patient survival by year of transplant (Living related transplant, 1993-2005)

Year of Transplant	**1993-1998**			**1999-2005**		
Interval (years)	No.	% Survival	SE	No.	% Survival	SE
1	181	97	1	182	96	1
3	168	95	1	131	94	1
5	158	93	1	62	94	1
7	146	91	1	1	94	1

* No.=Number at risk SE=standard error

Figure 5.4.9: Patient survival by year of transplant (Living related transplant, 1993-2005)



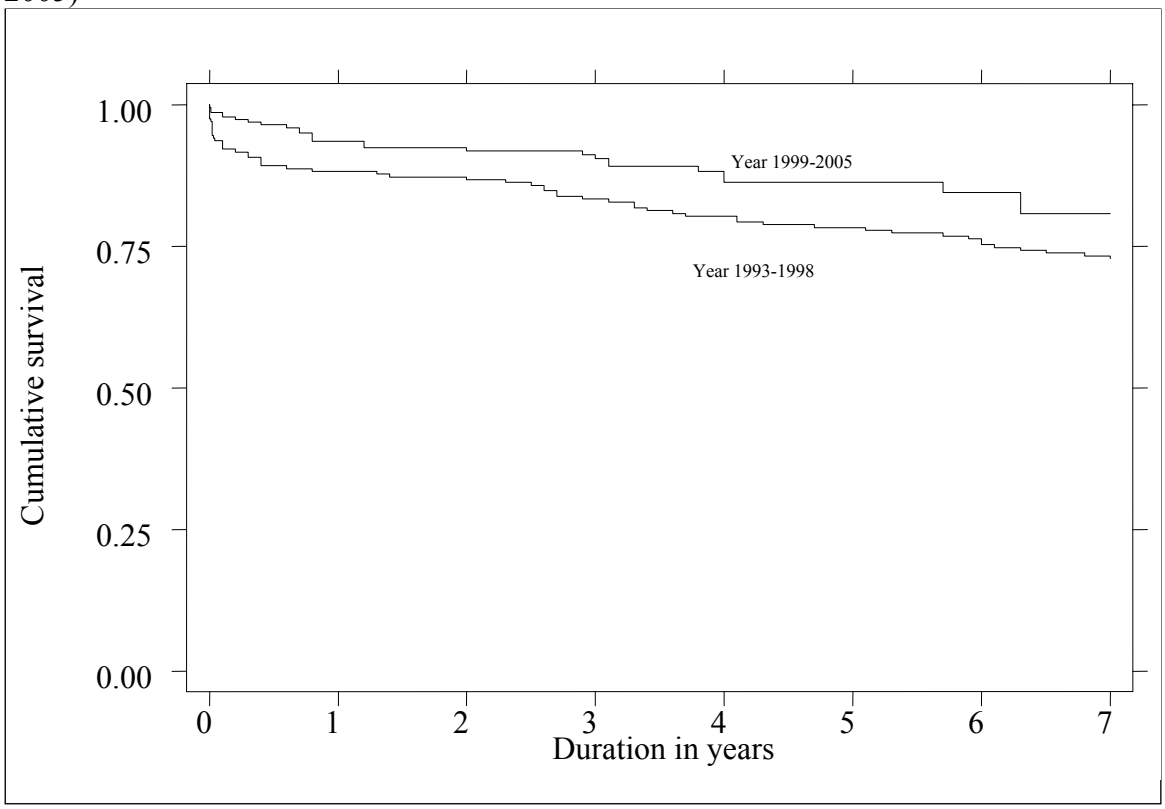
Interestingly, the risk of graft failure for living related donor renal transplantation improved for the 1999-2005 cohort compared to the 1993-1998 cohort (Table & Figure 5.4.10). One possible explanation, among others, is the increasing use of newer immunosuppressive agents such as MMF and FK506 in recent years.

Table 5.4.10: Graft survival by year of transplant (Living related transplant, 1993-2005)

Year of Transplant	**1993-1998**			**1999-2005**		
Interval (years)	No.	% Survival	SE	No.	% Survival	SE
1	181	88	1	182	94	1
3	168	83	1	131	90	1
5	158	78	1	62	86	1
7	146	73	1	1	81	1

* No.=Number at risk SE=standard error

Figure 5.4.10: Graft survival by year of transplant (Living related transplant, 1993-2005)



Interestingly, our data showed that commercial cadaveric transplants have excellent patient and graft survival rates, which are comparable to living related donor transplants for both 1993-1998 and 1999-2005 cohorts (Figure 5.4.11 and 5.4.12).

Table 5.4.11: Patient survival by year of transplant (Commercial cadaver transplant, 1993-2005)

Year of Transplant	1993-1998			1999-2005		
Interval (years)	No.	% Survival	SE	No.	% Survival	SE
1	288	94	1	544	96	1
3	275	92	1	290	93	1
5	248	87	1	115	90	1
7	226	84	1	2	-	-

* No.=Number at risk SE=standard error

Figure 5.4.11: Patient survival by year of transplant (Commercial cadaver transplant, 1993-2005)

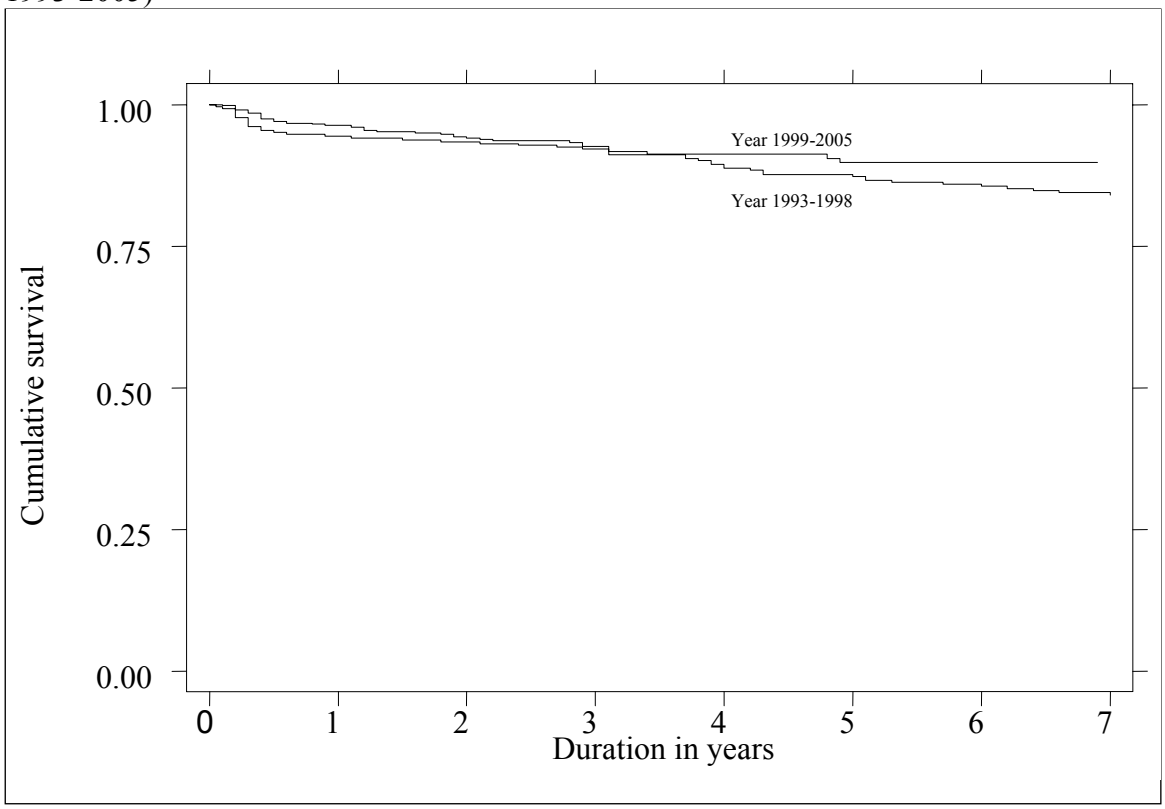
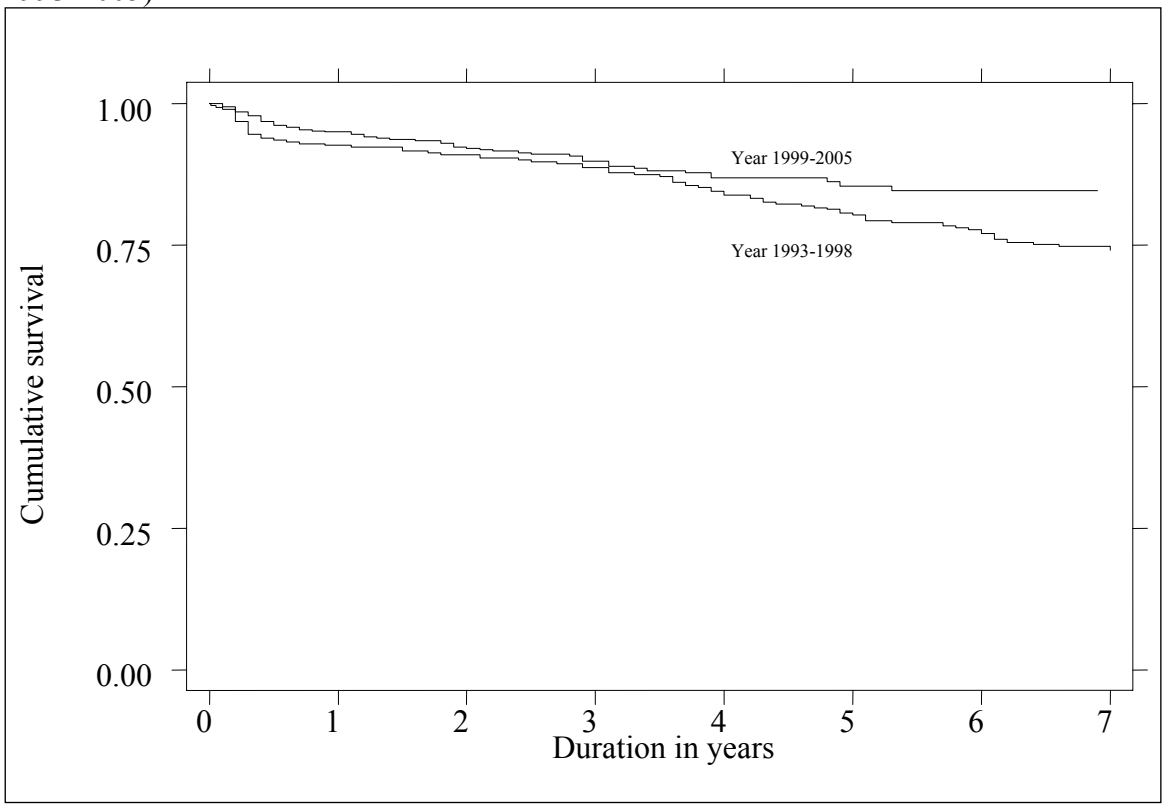


Table 5.4.12: Graft survival by year of transplant (Commercial cadaver transplant, 1993-2005)

Year of Transplant	**1993-1998**			**1999-2005**		
Interval (years)	No.	% Survival	SE	No.	% Survival	SE
1	288	93	1	544	95	1
3	275	89	1	290	90	1
5	248	80	1	115	85	1
7	226	74	1	2	-	-

* No.=Number at risk SE=standard error

Figure 5.4.12: Graft survival by year of transplant (Commercial cadaver transplant, 1993-2005)



5.5 Cardiovascular Risk in Renal Transplant Recipients

5.5.1 Risk factors for IHD

In year 2005, 88.2% of recipients were hypertensive, 22% had diabetes and 55% had renal insufficiency fulfilling the criteria for CKD III and above. A majority had 2 or more cardiovascular risk factors with 9.2% having 3 major risk factors.

Table 5.5.1: Risk factors for IHD in renal transplant recipients at year 2004 and 2005

	2004	**2005**
Diabetes	28 (1.9)	19 (1.2)
Hypertension**	504 (34.3)	513 (33.5)
CKD	121 (8.2)	142 (9.3)
Diabetes + Hypertension**	145 (9.9)	157 (10.3)
Diabetes + CKD	21 (1.4)	20 (1.3)
CKD + Hypertension**	530 (36.1)	538 (35.2)
Diabetes + CKD + Hypertension**	120 (8.2)	141 (9.2)

** Hypertension: BP systolic > 140 and BP diastolic >90
OR have either Beta blocker / Calcium channel blocker/ ACE inhibitor/ AIIRB / Other anti-hypertensive drugs
GFR(mL/min/1.73m^2) = 1.2*(140-age(year))* weight(kg) / creatinine(µmol/L) if male
GFR(mL/min/1.73m^2) = 0.85*(1.2*(140-age(year))* weight(kg) / creatinine(µmol/L)) if female.
CKD stage III – GFR, 30- 60
CKD stage IV – GFR, 15- 30
CKD stage V – GFR, < 15

Figure 5.5.1a: Venn Diagram for Pre and Post Transplant Complications (in %) at year 2004

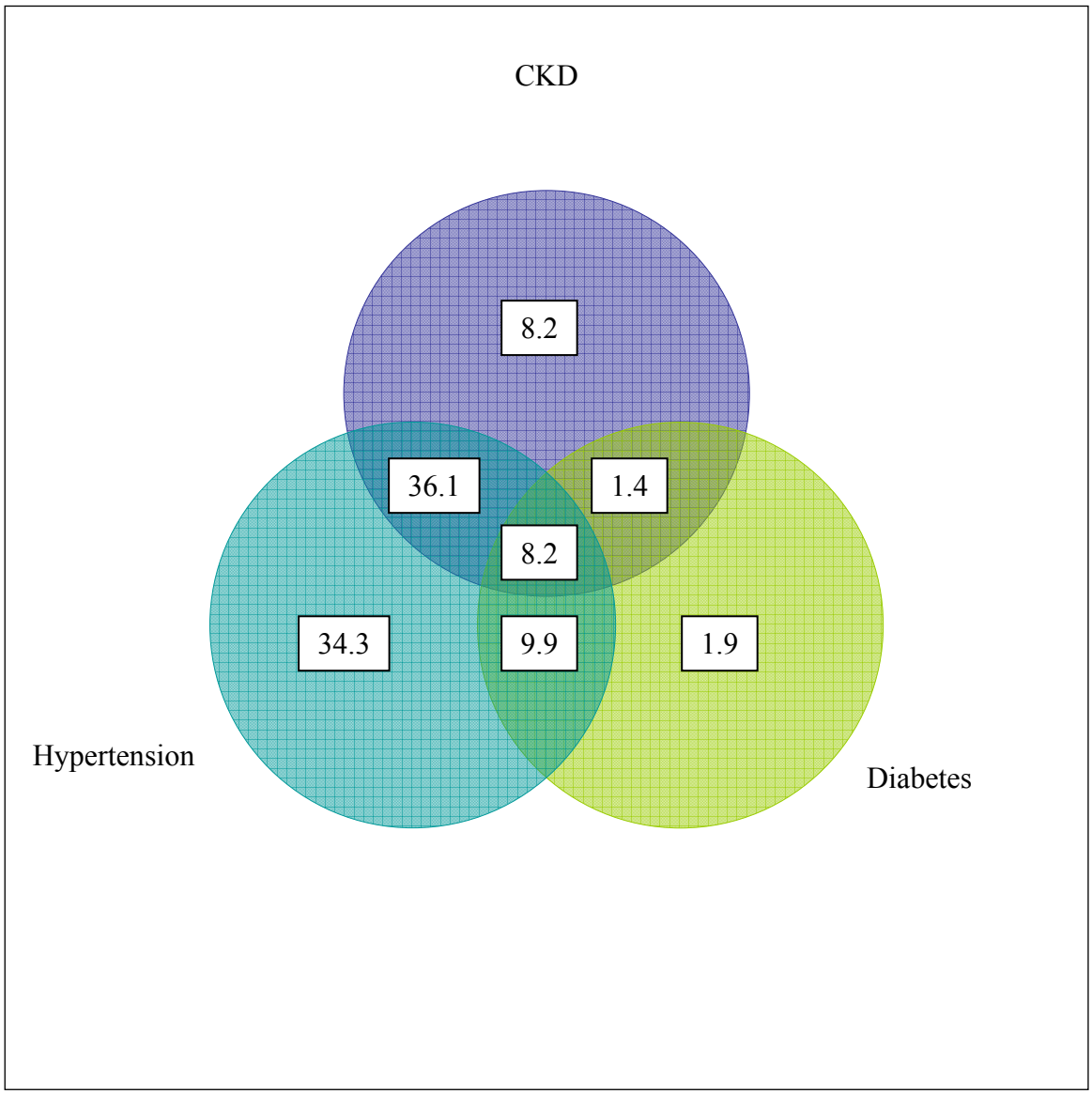
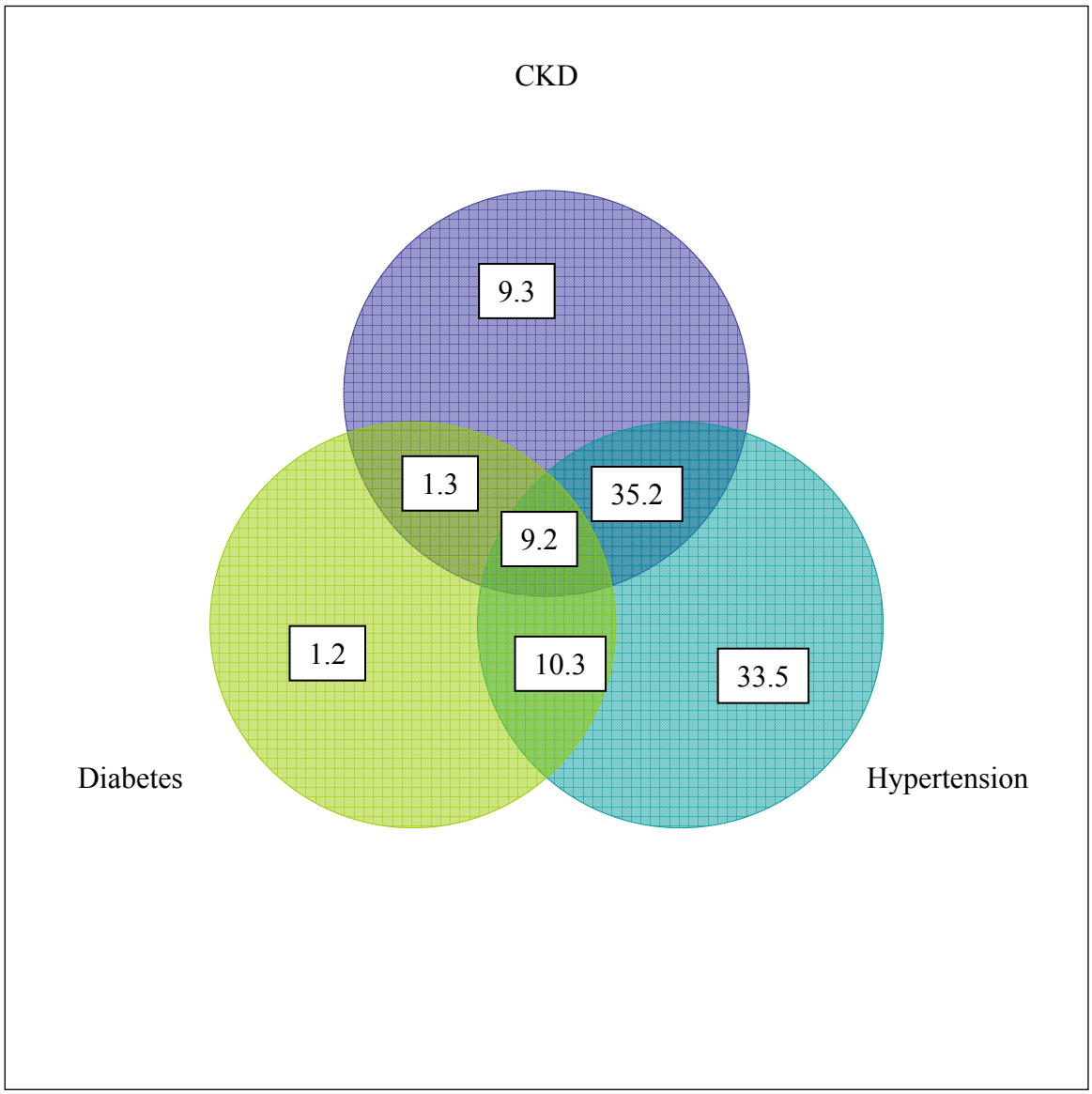


Figure 5.5.1b: Venn Diagram for Pre and Post Transplant Complications (in %) at year 2005



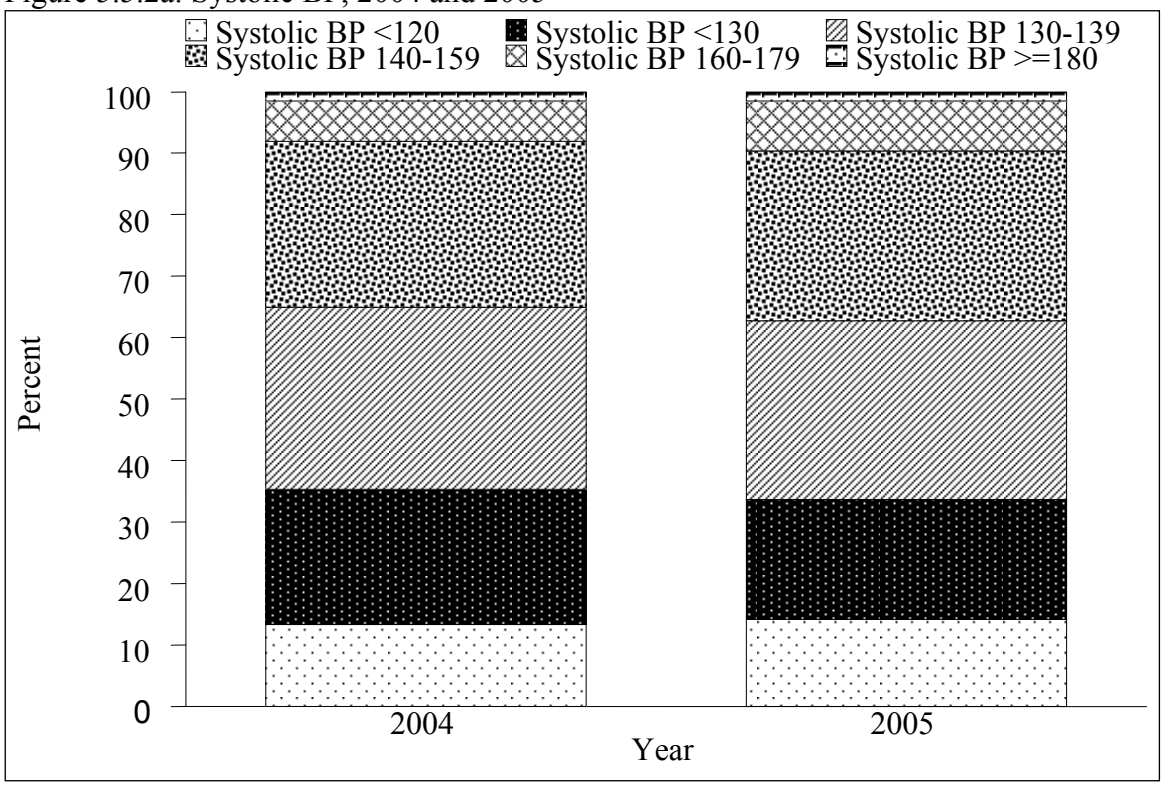
5.5.2 Blood Pressure classification according to JNC VI criteria, 2004 and 2005

8.1% had stage II systolic hypertension while another 1.5% had stage III systolic hypertension despite being on treatment.

Table 5.5.2a: Systolic BP, 2004 – 2005

	2004	**2005**
	No. (%)	No. (%)
Systolic BP <120	207 (13.4)	232 (14.2)
Systolic BP <130	341 (22.0)	318 (19.5)
Systolic BP 130-139	459 (29.6)	474 (29.0)
Systolic BP 140-159	418 (27.0)	452 (27.7)
Systolic BP 160-179	102 (6.6)	133 (8.1)
Systolic BP >=180	23 (1.5)	24 (1.5)

Figure 5.5.2a: Systolic BP, 2004 and 2005



4% had stage II diastolic hypertension while another 0.6% had stage III diastolic hypertension despite being on treatment.

Table 5.5.2b: Diastolic BP, 2004 and 2005

	2004	**2005**
	No. (%)	No. (%)
Diastolic BP<80	454 (29.3)	465 (28.5)
Diastolic BP<85	661 (42.6)	712 (43.6)
Diastolic BP 85-89	48 (3.1)	73 (4.5)
Diastolic BP 90-99	319 (20.6)	308 (18.9)
Diastolic BP 100-109	56 (3.6)	65 (4.0)
Diastolic BP >=110	12 (0.8)	10 (0.6)

Figure 5.5.2b: Diastolic BP, 2004 and 2005

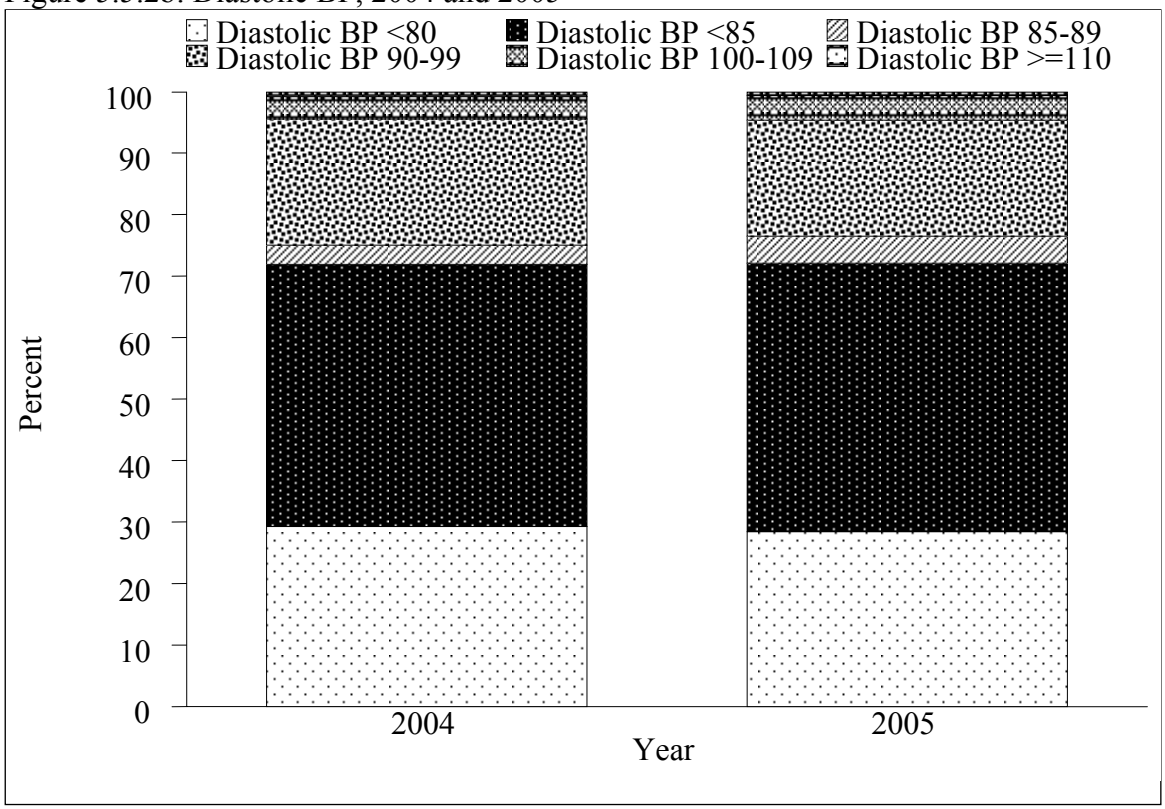
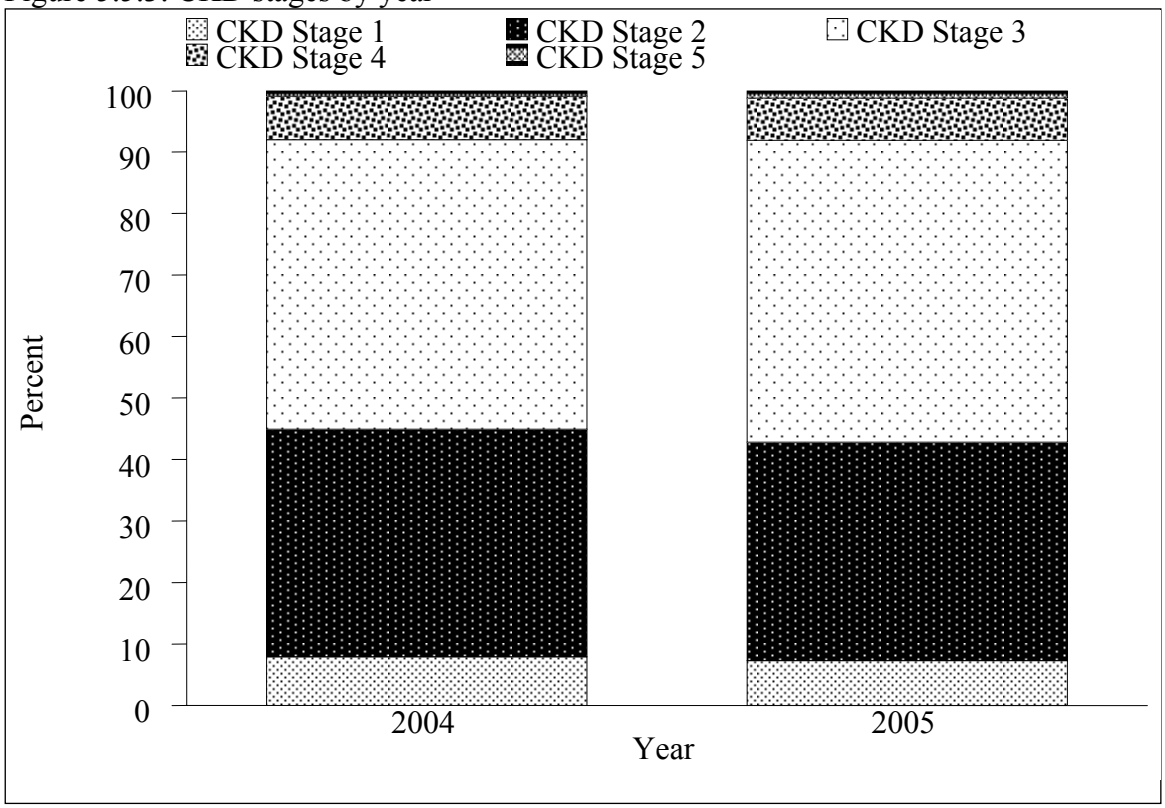


Table 5.5.3 shows classification of renal function according to CKD classification. Estimated GFR is calculated using the Cockroft and Gault equation. 49.1% had CKD III while another 8.1% had CKD IV or V.

Table 5.5.3: CKD stages, 2004 - 2005

	2004	**2005**
	No. (%)	No. (%)
CKD stage 1	121 (7.9)	118 (7.3)
CKD stage 2	570 (37.0)	578 (35.6)
CKD stage 3	726 (47.1)	798 (49.1)
CKD stage 4	110 (7.1)	112 (6.9)
CKD stage 5	13 (0.8)	19 (1.2)

Figure 5.5.3: CKD stages by year

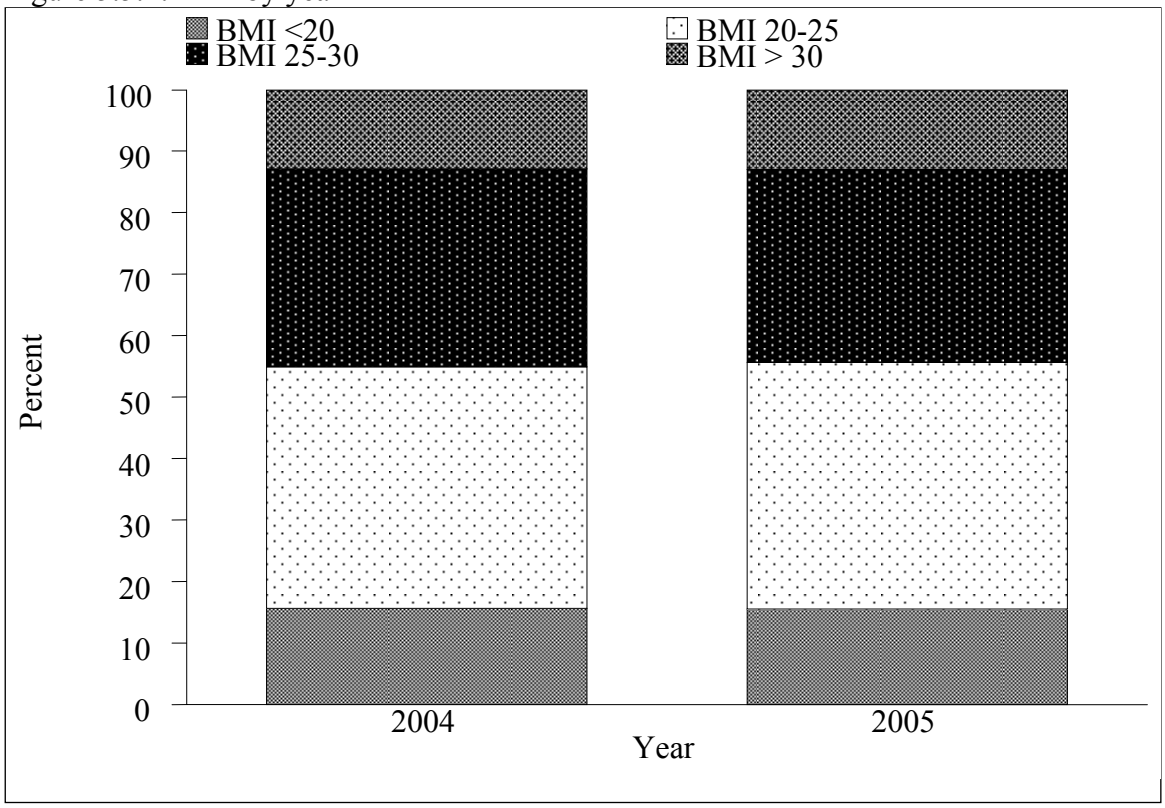


In year 2005, 31.4% were obese while another 13% were morbidly obese with BMI above 30.

Table 5.5.4: BMI, 2004 – 2005

	2004	**2005**
	No. (%)	No. (%)
BMI <20	242 (15.6)	253 (15.5)
BMI 20-25	610 (39.4)	656 (40.2)
BMI 25-30	499 (32.2)	512 (31.4)
BMI > 30	199 (12.8)	212 (13.0)

Figure 5.5.4: BMI by year



In year 2005, 21.7% had LDL cholesterol >=3.4 mmol/L, 62.4% had total cholesterol >5.2 while 7% had HDL cholesterol <1.

Table 5.5.5a: LDL, 2004 – 2005

	2004	**2005**
	No. (%)	No. (%)
LDL < 2.6	282 (18.2)	418 (25.6)
LDL 2.6-3.4	944 (60.9)	860 (52.7)
LDL >= 3.4	324 (20.9)	355 (21.7)

Figure 5.5.5a: LDL by year

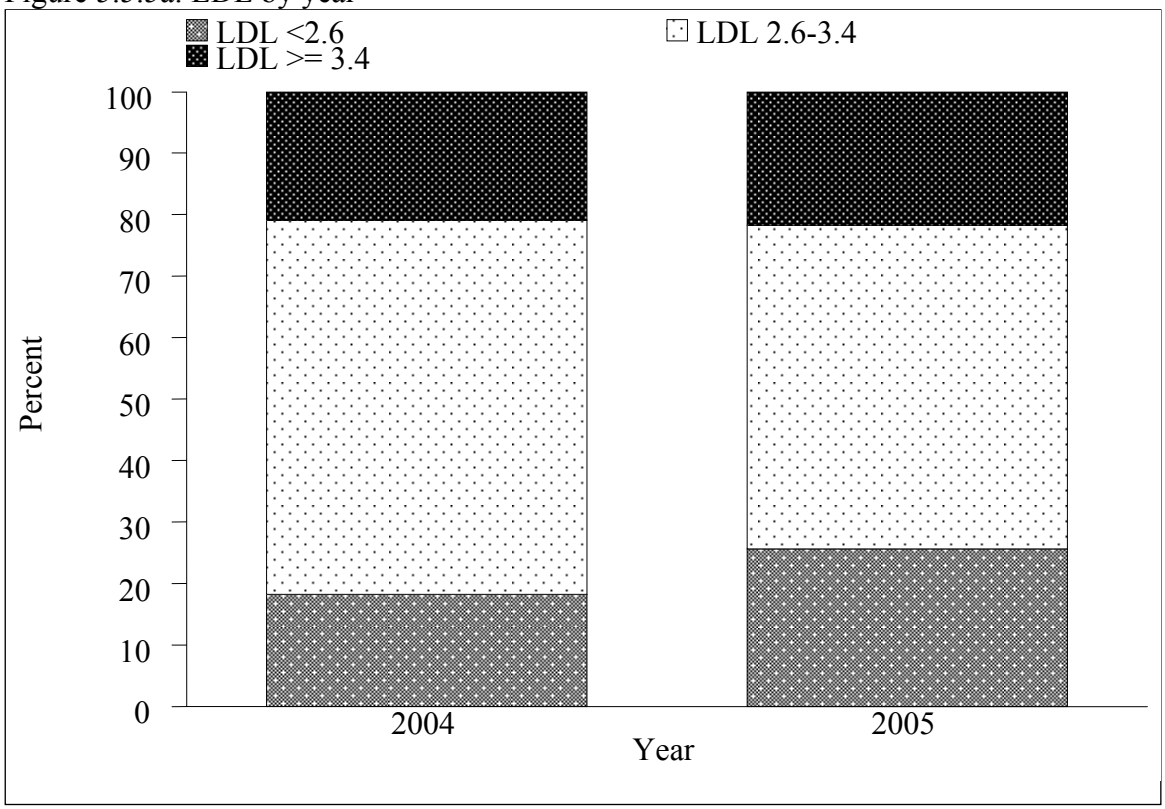


Table 5.5.5b: Total Cholesterol, 2004 - 2005

	2004	**2005**
	No. (%)	No. (%)
Total Cholesterol <4.1	113 (7.3)	159 (9.7)
Total Cholesterol 4.1-5.1	413 (26.6)	455 (27.9)
Total Cholesterol 5.2-6.2	751 (48.5)	772 (47.3)
Total Cholesterol 6.3- 7.2	197 (12.7)	173 (10.6)
Total Cholesterol > 7.2	76 (4.9)	74 (4.5)

Figure 5.5.5b: Total Cholesterol by year

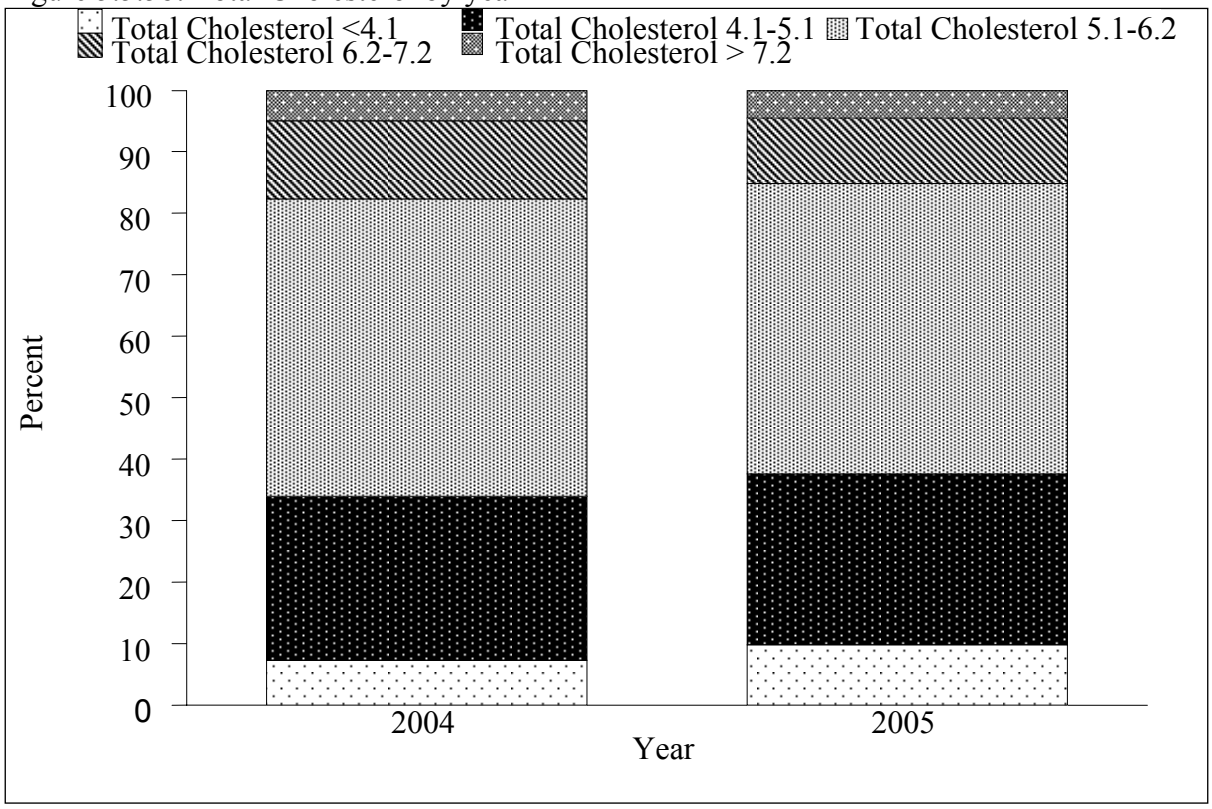
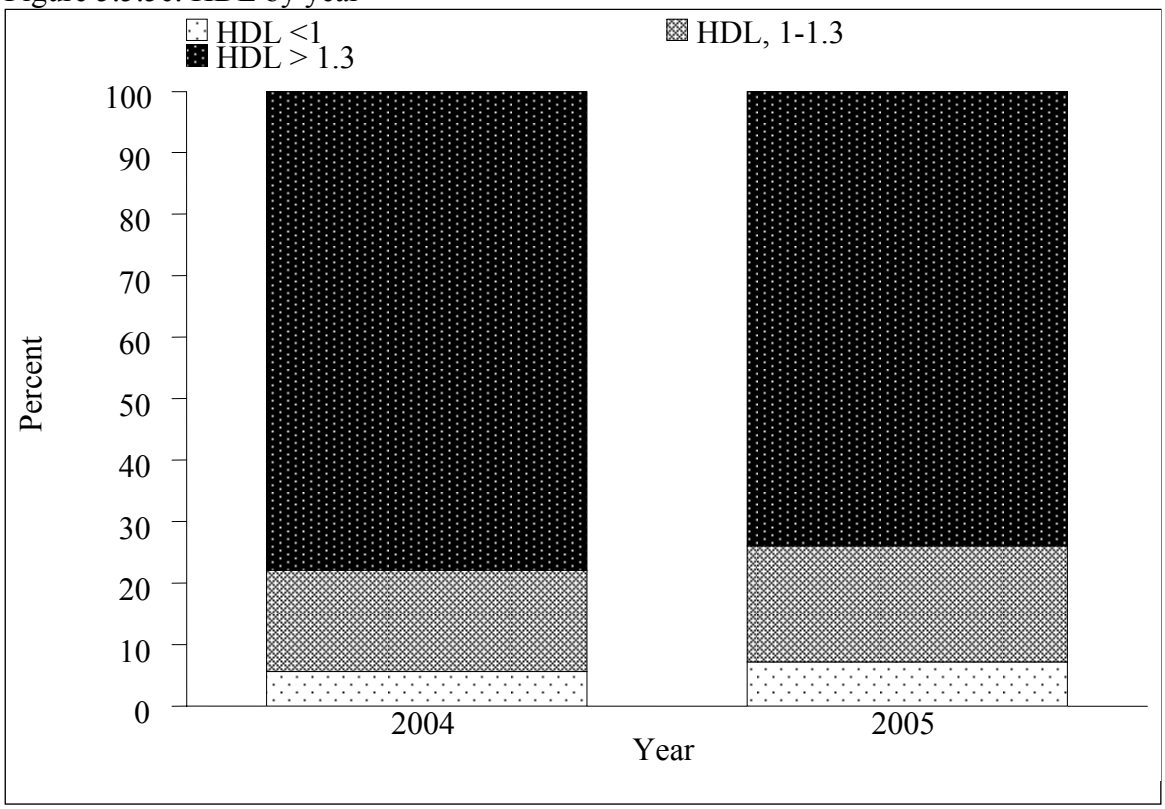


Table 5.5.5c: HDL, 2004 - 2005

	2004	**2005**
	No. (%)	No. (%)
HDL <1	87 (5.6)	118 (7.2)
HDL 1-1.3	255 (16.5)	308 (18.9)
HDL >1.3	1208 (77.9)	1207 (73.9)

Figure 5.5.5c: HDL by year



Majority of patients were on more than one anti-hypertensive drug with 34% on 2 anti-hypertensives while 18% required 3.

Table 5.5.6a: Treatment for hypertension, 2004 – 2005

Year	No.	% on anti-hypertensives	% on 1 anti-hypertensive drug	% on 2 anti-hypertensives	% on 3 anti-hypertensives
2004	1557	86	29	34	18
2005	1623	84	28	30	19

Table 5.5.6b: Distribution of Systolic BP without anti-hypertensives, 2004 – 2005

Year	No.	Mean	SD	Median	LQ	UQ	% Patients >= 160 mmHg
2004	181	126.3	13.7	130	120	130	4
2005	226	126.7	15.4	130	120	137	4

Table 5.5.6c: Distribution of Diastolic BP without anti-hypertensives, 2004 – 2005

Year	No.	Mean	SD	Median	LQ	UQ	% Patients >= 90 mmHg
2004	181	78.9	9.1	80	73	80	17
2005	226	79.3	11.5	80	70	80	18

Despite being on treatment, a substantial number of patients had SBP>=160 (11%) and DBP>=90 (25%).

Table 5.5.6d: Distribution of Systolic BP on anti-hypertensives, 2004 – 2005

Year	No.	Mean	SD	Median	LQ	UQ	% Patients >= 160 mmHg
2004	1311	133.1	16.4	130	120	140	9
2005	1338	134.3	17.9	130	120	143	11

Table 5.5.6e: Distribution of Diastolic BP on anti-hypertensives, 2004 – 2005

Year	No.	Mean	SD	Median	LQ	UQ	% Patients >= 90 mmHg
2004	1311	80.6	9.9	80	74	90	27
2005	1337	80.9	9.9	80	76	90	25