

CHAPTER 8



Kidney Donation

Reporting the number of deceased and living kidney donors in Australia and New Zealand and describing donor characteristics.

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Executive Summary

The total number of deceased donors continued to increase in both Australia and New Zealand in 2016. While this increase has historically been driven by increasing numbers of circulatory death donor and extended criteria brain death donors, 2016 also saw an increase in standard criteria brain death donors in Australia. New Zealand's increasing donor numbers were primarily driven by a more than doubling of the number of extended criteria brain death donors in 2016. In line with these observations, mean deceased donor age fell in Australia in 2016 against a long-term trend of increasing donor age, whereas mean donor age continued to gradually increase in New Zealand. Organ non-utilisation rates fell in both countries in 2016, although in Australia these remain above historical levels.

The total number of living kidney donor transplants has remained stable in Australia over the last few years, however, this has been reducing as a percentage of all transplants performed. New Zealand has seen an increasing number of living donor transplants each year since 2012, though the percentage of all transplants has remained stable. The proportion of living kidney transplants performed through paired kidney exchange has increased in recent years in both Australia and New Zealand.

Suggested citation

ANZDATA Registry. 40th Report, Chapter 8: Kidney donation. Australia and New Zealand Dialysis and Transplant Registry, Adelaide, Australia. 2018. Available at: <http://www.anzdata.org.au>

Deceased kidney donors

The data for this section come from the Australia and New Zealand Organ Donor (ANZOD) Registry. Much more information about deceased organ donors in Australia and New Zealand can be found on the ANZOD website, <http://www.anzdata.org.au/anzod/v1/indexanzod.html>

Figure 8.1 shows the different types of deceased kidney donors in each country over 2007-2016. In Australia there has been a large increase in the number of donors since 2008, driven by an increase in expanded criteria (ECD) and circulatory death (DCD) donors, although there was also an increase in the number of standard criteria (SCD) brain death donors (DBD) in 2016. In New Zealand the donor numbers have risen since 2012, and the proportion of DCD donors is much lower than in Australia. In 2016 in New Zealand there was a large increase in the number of expanded criteria donors.

Figure 8.1.1 - Deceased Kidney Donor Type - Australia 2007-2016

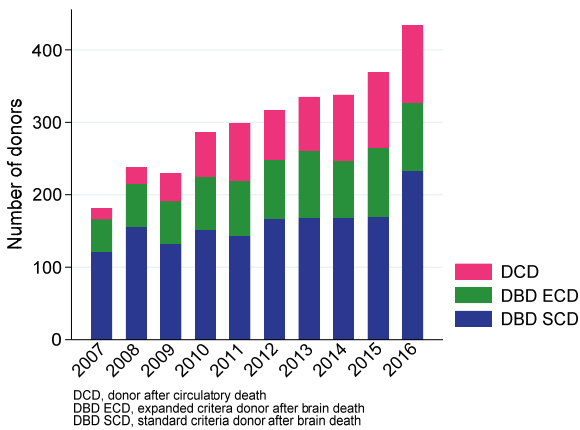
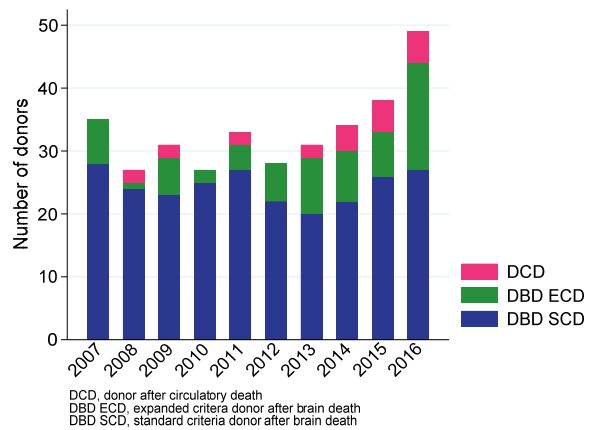


Figure 8.1.2 - Deceased Kidney Donor Type - New Zealand 2007-2016



The causes of death of deceased donors are shown in figure 8.2. Stroke remains the most common cause of kidney donor death in both Australia and New Zealand.

Figure 8.2.1 - Cause of Donor Death - Australia 2007-2016

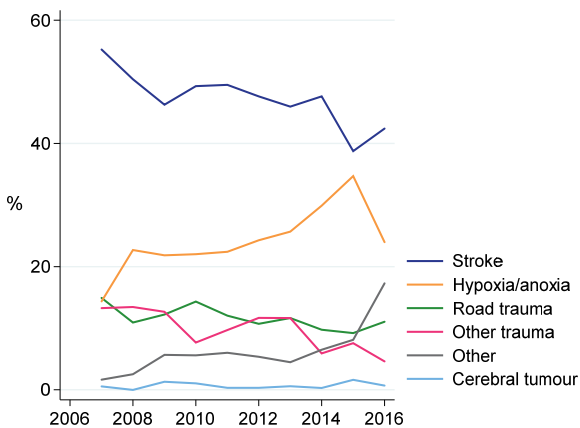


Figure 8.2.2 - Cause of Donor Death - New Zealand 2007-2016

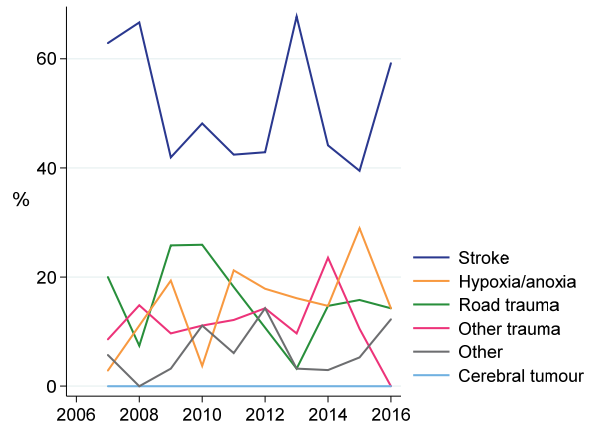


Figure 8.3 shows the mean age of deceased kidney donors in Australia and New Zealand over the last 20 years. In Australia the mean age was increasing steadily from 2001, however, a reduction was observed in 2016. In New Zealand there has also been a gradual increase in mean age which has continued in 2016, although there is more year to year fluctuation due to lower donor numbers.

Figure 8.3.1 - Deceased Kidney Donor Age - Australia 1997-2016

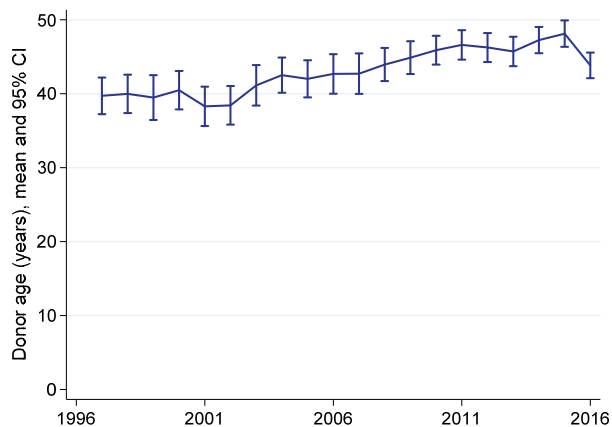


Figure 8.3.2 - Deceased Kidney Donor Age - New Zealand 1997-2016

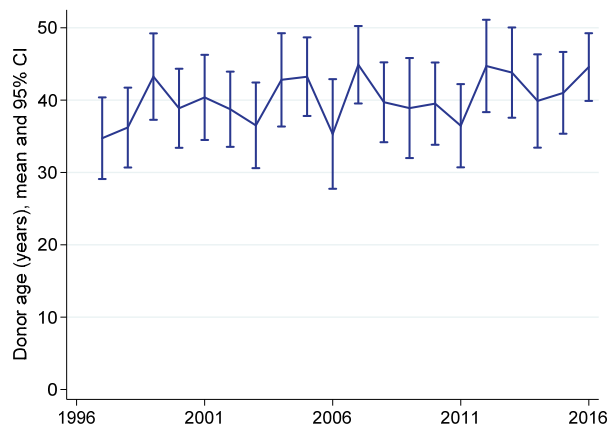


Figure 8.4 shows the non-utilisation rate of retrieved kidneys – the proportion of kidneys that were retrieved for the purpose of transplantation, but not ultimately transplanted into a recipient (either due to an absence of suitable recipients, or the kidney was deemed medically unsuitable after retrieval). Despite the increasing age and complexity of donors in Australia the non-utilisation rate remained steady at around 3% prior to 2012. However, this rate rose in 2013-16. In New Zealand non-utilisation rates have historically been slightly higher than in Australia (note the different y-axis scales).

Figure 8.4.1 - Non-utilisation Rate of Retrieved Kidneys - Australia 2007-2016

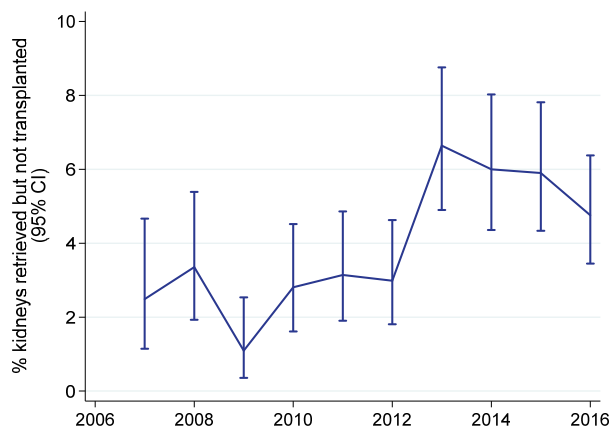
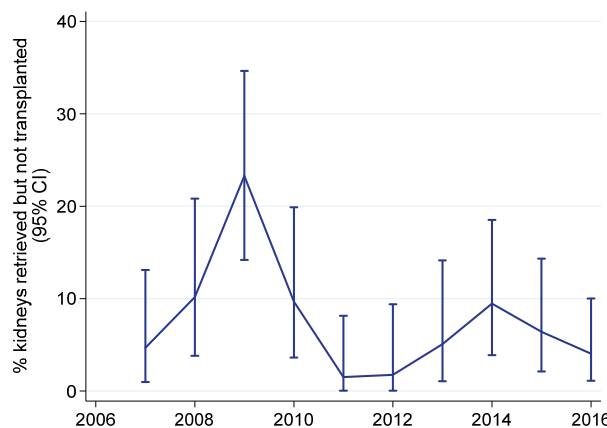


Figure 8.4.2 - Non-utilisation rate of retrieved kidneys - New Zealand 2007-2016



Living kidney donors

There were 264 living donor kidney transplants performed in 2016 in Australia, representing 24% of all transplant operations (table 8.1). Whereas in New Zealand, the 82 living donor transplants in 2016 represented 48% of all transplants. In Australia, living donor transplants have been falling as a proportion of all transplants since 2011, whereas in New Zealand this proportion has remained stable.

Table 8.1 Living Donor Percentage of Transplants by Country 2011-2016

Country	2011	2012	2013	2014	2015	2016
Australia	31%	28%	29%	29%	26%	24%
New Zealand	48%	50%	51%	52%	50%	48%

The living donor percentage of transplants in Australia and New Zealand is shown in figure 8.5 by recipient age groups for the years 2009-2012 and 2013-2016. The percentage of living donor transplants is higher for younger recipient age groups. In Australia, there has been a decrease in the living donor percentage of transplants in every age group from 2009-2012 to 2013-2016.

Figure 8.5.1 - Living Donor Percentage of Transplants—Australia - Stratified by Age of Recipient 2009-2012 vs 2013-2016

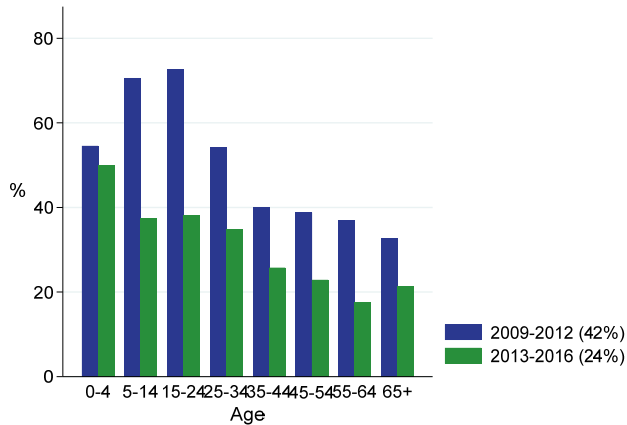


Figure 8.5.2 - Living Donor Percentage of Transplants—New Zealand - Stratified by Age of Recipient 2009-2012 vs 2013-2016

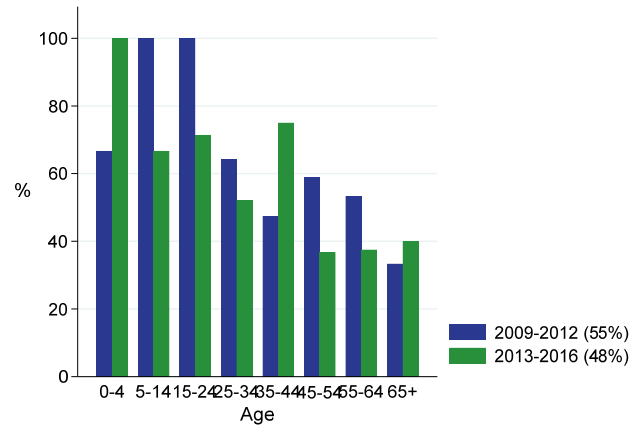


Figure 8.6 shows the living donor percentage of transplants for recipients aged 25-44 years by transplant region. There has been a decrease in this age group for each transplant region within Australia from 2009-2012 to 2013-2016, but the living donor percentage has remained stable in New Zealand.

Figure 8.6 - Living Donor Percentage of Transplants by Transplant Region - Age 25-44, 2009-2012 vs 2013-2016

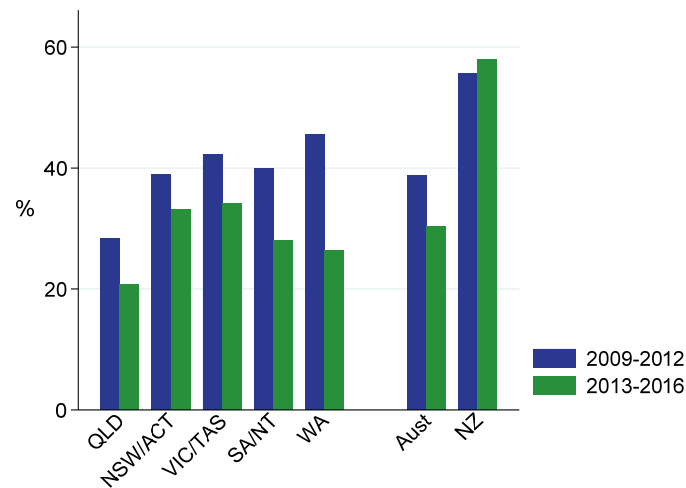


Figure 8.7 shows the number of living donors in Australia and New Zealand for the years 2007-2016 by donor age. Living donors in New Zealand are generally younger than those in Australia. Since 2008 the number of living donors aged 45-54 in Australia has decreased, and donors aged 55-64 are now the most common age group.

Figure 8.7.1 - Living Kidney Donor Age – Australia 2007-2016

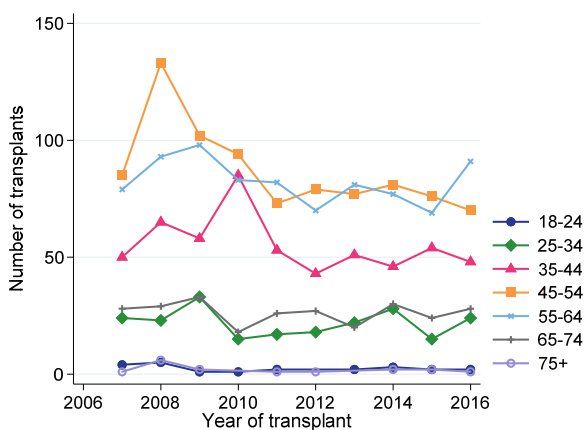
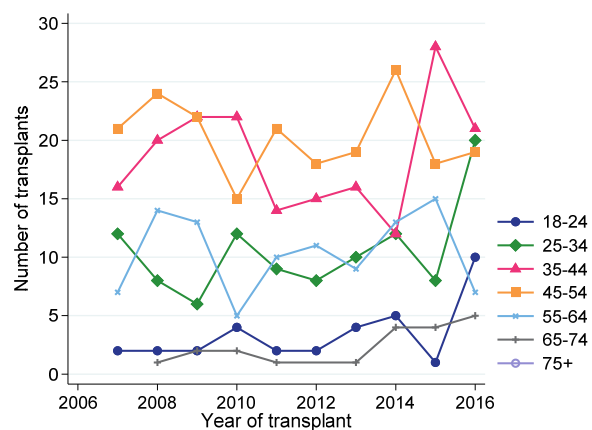


Figure 8.7.2 - Living Kidney Donor Age - New Zealand 2007-2016



The total number of living donor transplants has remained stable in Australia over the last few years. In New Zealand there has been an increasing number of living donor transplants since 2012 through an increase in numbers of genetically related donors (figure 8.8). The proportion of genetically related donors was 44% (117 donors) in 2016 in Australia whereas in New Zealand 50 donors (61%) were genetically related to their recipient. The proportion of living donor transplants performed through paired kidney exchange has increased in both Australia and New Zealand over the past 5 years.

Figure 8.8.1 - Source of Living Kidney Donor - Australia 2007-2016

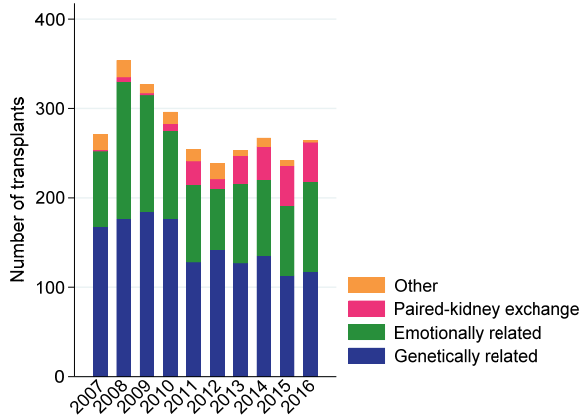


Figure 8.8.2 - Source of Living Kidney Donor - New Zealand 2007-2016

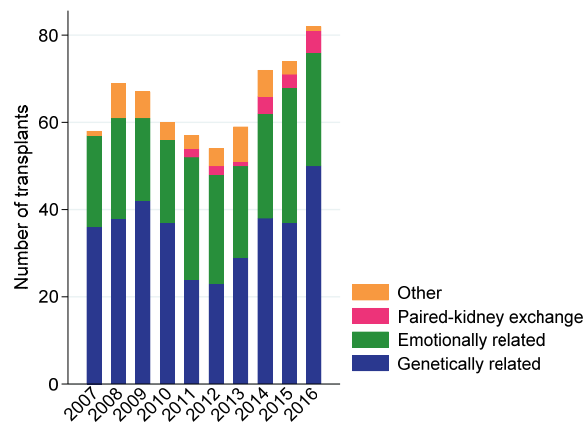


Table 8.2 provides details of the relationships between donors and recipients over 2012-2016 for Australia and New Zealand.

Table 8.2.1 Living Kidney Donor Relationship to Recipient, Australia, 2012-2016

Donor source	2012	2013	2014	2015	2016
Total	238	253	267	242	264
Genetically Related	142	127	135	113	117
Emotionally Related	68	89	85	78	101
Paired-Kidney Exchange	11	31	38	45	44
Other Unrelated	17	6	9	6	2
Sister	26	24	29	22	25
Brother	20	24	23	14	20
Mother	40	29	42	32	36
Father	35	28	22	30	17
Monzygotic (Identical Twin Girl)	0	0	0	0	0
Dizygotic (Non-Identical Twin Girl)	0	1	1	0	0
Dizygotic (Non-Identical Twin Boy)	0	0	0	1	0
Daughter	3	2	4	2	2
Son	3	6	5	3	5
Grandmother	3	1	3	1	2
Grandfather	0	1	1	0	0
Cousin	4	6	1	5	4
Niece	0	0	0	1	0
Nephew	0	0	0	0	2
Aunt	4	1	3	2	3
Uncle	4	3	1	0	1
Other related (Genetically - specify)	0	1	0	0	0
Wife	32	42	31	46	54
Husband	15	19	18	10	14
Partner	5	5	5	3	9
Mother-in-law	1	0	2	0	1
Father-in-law	1	1	0	1	0
Stepfather	1	0	1	0	1
Sister-in-law	1	1	1	2	0
Brother-in-law	2	4	3	2	0
Daughter-in-law	0	0	2	0	0
Son-in-law	0	0	0	0	1
Stepdaughter	0	0	0	0	0
Stepson	0	1	0	0	0
Friend	9	14	19	14	18
Other related (Emotionally - specify)	1	2	3	0	3
Directed kidney exchange	11	31	36	42	42
Non-directed, kidney exchange	0	0	2	3	2
Non-directed, waiting list	4	2	5	0	0
Pathological	13	3	4	6	2
Other unrelated (specify)	0	1	0	0	0

Table 8.2.2 Living Kidney Donor Relationship to Recipient, New Zealand, 2012-2016

Donor source	2012	2013	2014	2015	2016
Total	54	59	72	74	82
Genetically Related	23	29	38	37	50
Emotionally Related	25	21	24	31	26
Paired-Kidney Exchange	2	1	4	3	5
Other Unrelated	4	8	6	3	1
Sister	3	5	7	5	6
Brother	1	9	6	7	13
Mother	4	6	7	10	4
Father	6	2	5	3	8
Monzygotic (Identical Twin Girl)	0	0	0	0	1
Dizygotic (Non-Identical Twin Girl)	0	0	0	0	0
Dizygotic (Non-Identical Twin Boy)	0	0	0	1	0
Daughter	4	2	3	7	7
Son	4	3	4	2	9
Grandmother	0	0	0	0	0
Grandfather	0	0	0	0	0
Cousin	0	1	4	0	1
Niece	1	0	1	0	0
Nephew	0	0	0	0	1
Aunt	0	1	0	1	0
Uncle	0	0	0	1	0
Other related (Genetically - specify)	0	0	1	0	0
Wife	8	7	12	13	8
Husband	1	3	0	1	1
Partner	1	2	0	2	3
Mother-in-law	0	1	0	1	1
Father-in-law	0	0	0	0	0
Stepfather	0	0	0	0	0
Sister-in-law	0	1	1	1	0
Brother-in-law	0	0	0	1	1
Daughter-in-law	0	0	0	0	0
Son-in-law	0	1	0	0	0
Stepdaughter	0	1	0	0	2
Stepson	0	0	0	0	0
Friend	14	5	10	12	10
Other related (Emotionally - specify)	1	0	1	0	0
Directed kidney exchange	2	1	4	3	4
Non-directed, kidney exchange	0	0	0	0	1
Non-directed, waiting list	4	8	6	3	1
Pathological	0	0	0	0	0
Other unrelated (specify)	0	0	0	0	0

The gender distribution of living donors by relation to recipient, state and country is shown in table 8.3.

Table 8.3 Gender Distribution of Living Donors by Relation to Recipient and Transplant Region 2012-2016

Donor Relationship	Transplant Region	2012			2013			2014			2015			2016		
		M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Genetically Related	NSW/ACT	43%	57%	46	40%	60%	58	36%	64%	56	44%	56%	45	57%	43%	46
	VIC/ TAS	40%	60%	50	65%	35%	34	39%	61%	44	48%	52%	29	34%	66%	38
	QLD	38%	62%	21	44%	56%	18	40%	60%	15	38%	62%	13	36%	64%	14
	SA/NT	57%	43%	14	60%	40%	5	44%	56%	9	45%	55%	11	13%	88%	8
	WA	55%	45%	11	83%	17%	12	55%	45%	11	47%	53%	15	18%	82%	11
	Australia	44%	56%	142	52%	48%	127	39%	61%	135	45%	55%	113	40%	60%	117
	New Zealand	48%	52%	23	48%	52%	29	45%	55%	38	38%	62%	37	62%	38%	50
Genetically Unrelated	NSW/ACT	44%	56%	27	32%	68%	50	33%	67%	54	36%	64%	39	37%	63%	59
	VIC/ TAS	47%	53%	36	47%	53%	49	56%	44%	45	43%	57%	53	35%	65%	48
	QLD	30%	70%	10	50%	50%	10	73%	27%	11	55%	45%	20	36%	64%	14
	SA/NT	33%	67%	9	43%	57%	7	50%	50%	8	50%	50%	6	23%	77%	13
	WA	36%	64%	14	60%	40%	10	43%	57%	14	45%	55%	11	46%	54%	13
	Australia	42%	58%	96	42%	58%	126	46%	54%	132	43%	57%	129	36%	64%	147
	New Zealand	26%	74%	31	33%	67%	30	21%	79%	34	19%	81%	37	38%	63%	32

In 2016, Australia reached its highest ever number of ABO incompatible living donor transplants at 45, the number have been relatively stable in New Zealand over the past 5 years (table 8.4).

Table 8.4 Transplant Numbers by Blood Group Status 2007-2016

Country	Year	Compatible	Incompatible	Unknown
Australia	2007	247	22	2
	2008	317	36	1
	2009	294	30	3
	2010	255	40	1
	2011	213	35	6
	2012	187	27	24
	2013	195	36	22
	2014	198	36	33
	2015	194	27	21
	2016	190	45	29
New Zealand	2007	58	0	0
	2008	66	1	2
	2009	64	2	1
	2010	59	1	0
	2011	49	3	5
	2012	46	5	3
	2013	51	6	2
	2014	58	8	6
	2015	64	9	1
	2016	73	6	3

Living donor characteristics

Table 8.5 shows the clinical characteristics of living kidney donors over 2007-2016. Donors were predominantly Caucasian and commonly overweight or obese. A history of smoking was common. Australian donors were older and more likely to have hypertension compared to New Zealand donors.

Table 8.5 Living Donor Clinical Characteristics 2007-2016

Factor	Australia	New Zealand
N	2682	652
Age (years), mean (SD)	50.6 (11.0)	44.0 (11.5)
Gender		
Female	1564 (58.3%)	379 (58.1%)
Male	1118 (41.7%)	273 (41.9%)
Ethnicity		
Caucasian	2388 (89.0%)	516 (79.1%)
Aboriginal/Torres Strait Islander	68 (2.5%)	9 (1.4%)
Asian	134 (5.0%)	40 (6.1%)
Māori	12 (0.4%)	60 (9.2%)
Pacific	7 (0.3%)	12 (1.8%)
Other	45 (1.7%)	3 (0.5%)
Not reported	28 (1.0%)	12 (1.8%)
Body mass index		
<18.5 (underweight)	19 (0.7%)	2 (0.3%)
18.5-24.9 (normal)	906 (33.8%)	234 (35.9%)
25-29.9 (overweight)	1186 (44.2%)	277 (42.5%)
>=30 (obese)	479 (17.9%)	118 (18.1%)
Not reported	92 (3.4%)	21 (3.2%)
Hypertension	658 (24.6%)	60 (9.2%)
Glycaemic status		
Normal	2541 (94.7%)	621 (95.2%)
Impaired fasting glucose	18 (0.7%)	1 (0.2%)
Impaired glucose tolerance	66 (2.5%)	1 (0.2%)
Diabetic	8 (0.3%)	1 (0.2%)
Not reported	49 (1.8%)	28 (4.3%)
Cigarette Smoking		
Never	1594 (59.4%)	384 (58.9%)
Former	937 (34.9%)	161 (24.7%)
Current	103 (3.8%)	80 (12.3%)
Not reported	48 (1.8%)	27 (4.1%)

Timing of living kidney donor transplantation

The timing of primary living donor transplants relative to the start of dialysis is shown in table 8.6.

The proportion of all primary living donor transplants performed “pre-emptively” in Australia in 2016 was 44%. 24% of recipients had received dialysis treatment for twelve months or longer prior to a first living donor graft.

The proportion of pre-emptive primary living donor transplants in New Zealand in 2016 was 24%, a relatively stable number that is consistently lower than in Australia. 52% received dialysis for twelve months or longer prior to being transplanted.

Table 8.6 Timing of Living Kidney Donor Transplants 2012-2016

Country	Timing of Transplant	2012	2013	2014	2015	2016
Australia	Pre-emptive	74 (35%)	85 (38%)	85 (36%)	93 (44%)	104 (44%)
	<1 month post dialysis	6 (3%)	9 (4%)	4 (2%)	1 (<1%)	6 (3%)
	1 month to <1 year post dialysis	71 (33%)	65 (29%)	75 (32%)	46 (22%)	68 (29%)
	>=1 year post dialysis	62 (29%)	65 (29%)	73 (31%)	72 (34%)	57 (24%)
New Zealand	Pre-emptive	15 (31%)	15 (26%)	19 (28%)	19 (28%)	18 (24%)
	<1 month post dialysis	1 (2%)	2 (4%)	-	1 (1%)	1 (1%)
	1 month to <1 year post dialysis	12 (24%)	9 (16%)	15 (22%)	13 (19%)	17 (23%)
	>=1 year post dialysis	21 (43%)	31 (54%)	33 (49%)	35 (51%)	39 (52%)