CHAPTER 10

End Stage Kidney Disease in indigenous peoples of Australia and Aotearoa/New Zealand

Reporting the incidence, prevalence and survival of indigenous renal replacement therapy patients in Australia and New Zealand.

Contents

Executive Summary

In this chapter, the rates and practice patterns for end-stage kidney disease for people identifying as Aboriginal and Torres Strait Islander living in Australia and Māori resident in Aotearoa New Zealand are reported. We acknowledge the distinctiveness of many nations of Aboriginal and Torres Strait Islander peoples, and now respectfully refer to them as Indigenous Australians within this report. Information for Pacific Peoples living in Aotearoa/New Zealand is also displayed. ANZDATA acknowledges that Pacific peoples are not indigenous to New Zealand, but have included them here as an ethnic group that is exposed to factors that link to risks of end-stage kidney disease, specific clinical practice patterns and patient outcomes. Self-identified ethnicity is reported by renal units on behalf of patients. Further changes are envisaged in future reports; in particular for the 2019 report we anticipate including Maori and Pacific Peoples as specific sections within a broader New Zealand chapter.

Denominator population statistics are stratified by ethnicity. For example, the incidence of RRT for Indigenous Australians includes the Indigenous Australian population as the denominator. In Aotearoa/New Zealand, the denominator population is derived from the mid-year population (30 June) estimated each year by Statistics New Zealand from the Census (currently 2013). Denominator populations are not age-standardized. Notably, indigenous and non-indigenous populations possess different age structures: Indigenous populations tend to be younger and demonstrate onset of long-term conditions at ages 10-20 years younger than non-indigenous communities.

Suggested Citation

ANZDATA Registry. 41st Report, Chapter 10: End Stage Kidney Disease in Indigenous peoples of Australia and Aotearoa/New Zealand. Australia and New Zealand Dialysis and Transplant Registry, Adelaide, Australia. 2018. Available at: http://www.anzdata.org.au

New Patients

A total of 354 Aboriginal and Torres Strait Islander people commenced dialysis in Australia during 2017 (table 10.1). The majority (86%) were treated with haemodialysis as their initial RRT modality (figure 10.1.1). No pre-emptive kidney transplants were accessed by Indigenous Australians in 2017.

Haemodialysis incidence was approximately 5-fold higher for Indigenous Australians (400 pmp) than for non-indigenous Australians (74 pmp). Only 14% of Indigenous Australians accessed peritoneal dialysis as first treatment compared with over one-quarter of non-indigenous Australians.

A total of 186 patients identifying as Māori commenced treatment for end-stage kidney disease in 2017, representing 30% of all patients starting renal replacement therapy. This disparity in the incidence of end-stage kidney disease for Māori persists. The rate of haemodialysis commencement for non-Māori, non-Pacific patients was 4-fold lower than for Māori. As in Australia, Māori are much more likely to commence dialysis with haemodialysis than peritoneal dialysis compared with non-Māori patients (figure 10.1.2). Only 2 Māori patients received a pre-emptive kidney transplant during 2017. In the last 5 years, 6 Māori patients have received a pre-emptive kidney transplant compared with 99 non-Māori, non-Pacific patients (a 17-fold difference).

Table 10.1 New Patients (pmp) 2013-2017

Year	Modality	Australia			New Zealand			
		Non-indigenous	Indigenous	Total	Non-Māori, non-Pacific	Māori	Pacific People	Total
2013	**HD**	1575 (70)	238 (341)	**1813 (78)**	136 (40)	128 (185)	93 (270)	**357 (80)**
2013	**PD**	667 (30)	42 (60)	**709 (31)**	95 (28)	60 (87)	24 (70)	**179 (40)**
2013	**Graft**	81 (4)	0 (0)	**81 (3)**	16 (5)	2 (3)	1 (3)	**19 (4)**
2014	**HD**	1578 (69)	264 (370)	**1842 (78)**	134 (39)	110 (157)	105 (298)	**349 (77)**
2014	**PD**	743 (33)	36 (50)	**779 (33)**	107 (31)	51 (73)	29 (82)	**187 (41)**
2014	**Graft**	83 (4)	4 (6)	**87 (4)**	20 (6)	0 (0)	1 (3)	**21 (5)**
2015	**HD**	1570 (68)	251 (344)	**1821 (76)**	126 (36)	121 (170)	65 (180)	**312 (68)**
2015	**PD**	707 (31)	37 (51)	**744 (31)**	128 (36)	52 (73)	40 (111)	**220 (48)**
2015	**Graft**	85 (4)	1 (1)	**86 (4)**	22 (6)	0 (0)	2 (6)	**24 (5)**
2016	**HD**	1599 (68)	268 (359)	**1867 (77)**	142 (39)	108 (149)	86 (232)	**336 (72)**
2016	**PD**	728 (31)	41 (55)	**769 (32)**	114 (32)	61 (84)	33 (89)	**208 (44)**
2016	**Graft**	79 (3)	1 (1)	**80 (3)**	20 (6)	2 (3)	1 (3)	**23 (5)**
2017	**HD**	1773 (74)	306 (400)	**2079 (85)**	146 (40)	122 (166)	100 (263)	**368 (77)**
2017	**PD**	733 (31)	48 (63)	**781 (32)**	113 (31)	62 (84)	43 (113)	**218 (45)**
2017	**Graft**	122 (5)	0 (0)	**122 (5)**	21 (6)	2 (3)	3 (8)	**26 (5)**

Figure 10.1.1 - Percentage of New Patients Commencing on Haemodialysis - Australia

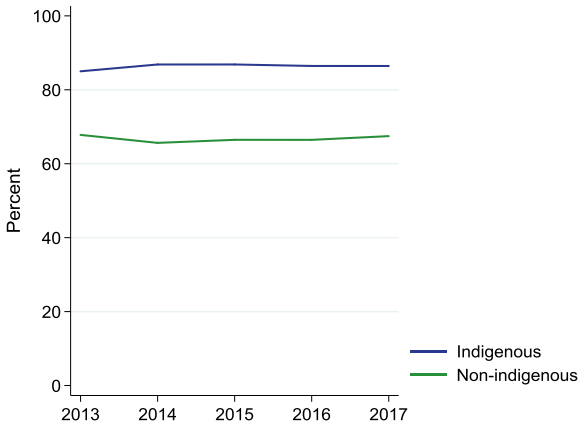
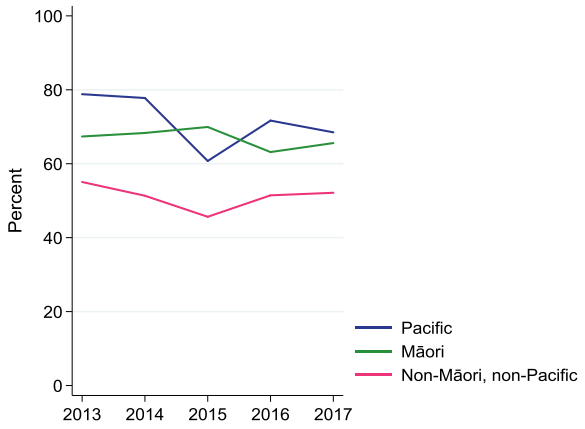


Figure 10.1.2 - Percentage of New Patients Commencing on Haemodialysis - New Zealand



Primary Renal Disease

The primary renal diseases of new patients over 2013-2017 are shown in table 10.2. Indigenous peoples experience diabetes at a substantially higher rate than non-indigenous patients in both Australia and New Zealand.

Table 10.2 Primary Renal Disease of New Patients 2013-2017

Primary Renal Disease	Australia		New Zealand		
	Non-indigenous	Indigenous	Non-Māori, non-Pacific	Māori	Pacific People
Diabetic Nephropathy	4064 (34%)	1071 (70%)	374 (28%)	618 (70%)	432 (69%)
Glomerulonephritis	2417 (20%)	152 (10%)	349 (26%)	121 (14%)	97 (15%)
Hypertension	1768 (15%)	112 (7%)	186 (14%)	40 (5%)	32 (5%)
Polycystic Disease	852 (7%)	11 (1%)	109 (8%)	12 (1%)	7 (1%)
Reflux Nephropathy	274 (2%)	14 (1%)	45 (3%)	12 (1%)	7 (1%)
Other	1836 (15%)	82 (5%)	215 (16%)	56 (6%)	36 (6%)
Uncertain	644 (5%)	48 (3%)	53 (4%)	16 (2%)	12 (2%)
Not reported	268 (2%)	47 (3%)	9 (1%)	6 (1%)	3 (<1%)
Total	**12123**	**1537**	**1340**	**881**	**626**

Incidence Rates

Overall, the incidence rates (per million of population) of end-stage kidney disease for Indigenous patients are markedly and persistently higher than those for non-indigenous patients. The disparity is confounded and underestimated by the age distributions of each population - Indigenous populations of both countries are considerably younger.

Although rates fluctuate from year to year, in Australia the incidence rate among Indigenous people is slowly increasing. In New Zealand the incidence rate among Maori has stabilized, but that for Pacific People is progressively rising (figure 10.2). The relative rate differs with age and also (for Indigenous Australians) with gender - this is illustrated in figures 10.3 and 10.4.

Figure 10.2.1 - Unadjusted Incident RRT Rate - Australia

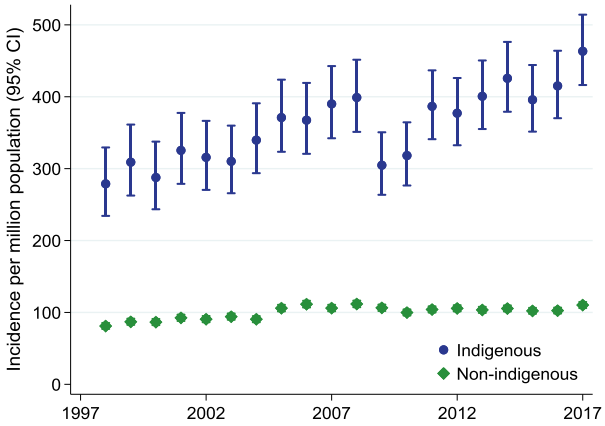
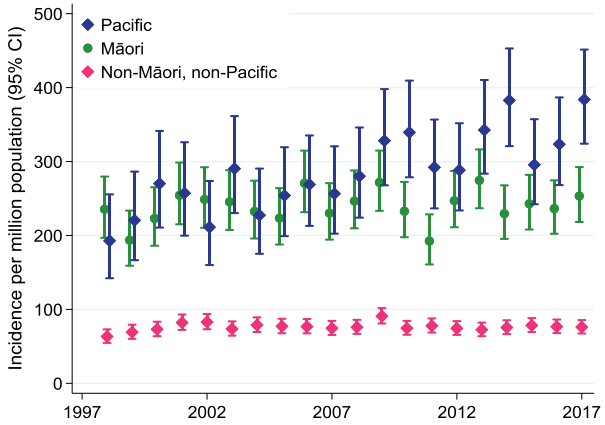


Figure 10.2.2 - Unadjusted Incident RRT Rate - New Zealand



Indigenous Australians experience higher rates of end-stage kidney disease at all ages. This disparity is particularly evident for Indigenous women and is also particularly marked even in the second and third decades of life for both men and women (figure 10.3).

Among Māori and Pacific Peoples, disparities in the incidence of end-stage kidney disease occur as early as ages 15 to 24 years and are evident across all age groups (figure 10.4). There is no indication of gender differences in New Zealand.

Figure 10.3 - Relative Incidence Rate of Treated ESKD for Indigenous Patients by Gender - Australia 2013-2017

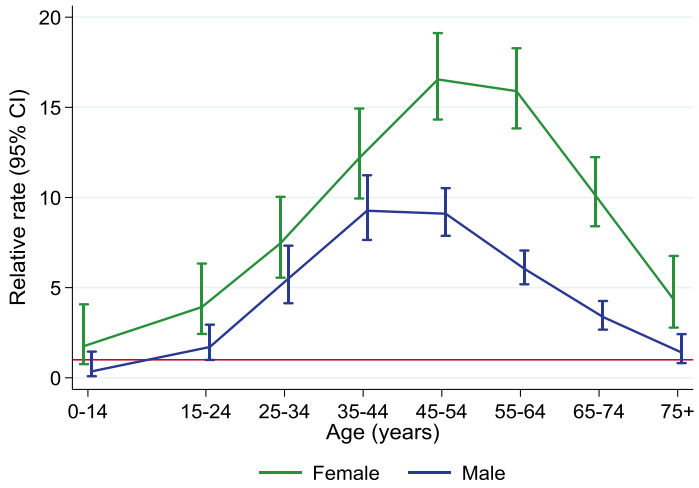
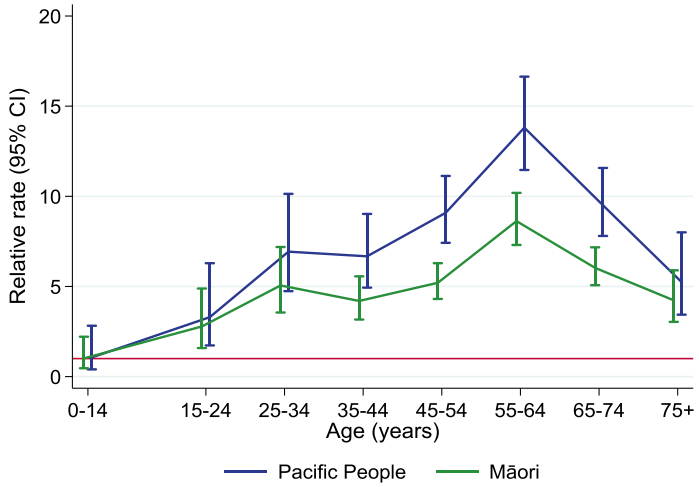


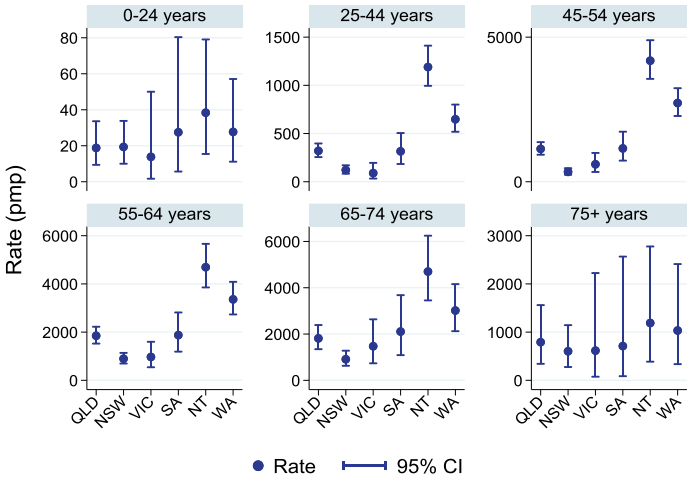
Figure 10.4 - Relative Incidence Rate of Treated ESKD for Māori and Pacific Patients - New Zealand 2013-2017



There is also considerable variation in the incidence of renal replacement therapy for Indigenous Australians across Australian States and Territories (figure 10.5; note that the Y axis scales vary).

While rates for the very young (<25 years) and older (>75 years) groups are similar in each State/Territory, the rates for people 25-74 years of age show a clear trend of progressively higher rates from NSW/Victoria to Queensland then South Australia, Western Australia and the Northern Territory. Data are shown for a five-year period given the small numbers in some locations.

Figure 10.5 - Age-specific Incidence Rates of Treated ESKD - Among Indigenous Australians, by State and Age at RRT start 2013-2017. Note the Y axis scales vary between panels.



The patterns of age-specific incidence rates of RRT differ between Indigenous and non-indigenous groups in Australia. This difference is particularly marked among those aged 25-44 years (figure 10.6). There are a number of factors which contribute to incident numbers of RRT (among both Indigenous and non-indigenous people). It is not clear whether the increase in that age group reflects the underlying rates of diabetes, rates of disease progression, referral patterns, or other diseases.

Figure 10.6.1 - Age-specific Incidence Rates of Treated ESKD - Non-indigenous, Australia. Note the Y axis scales vary between panels.

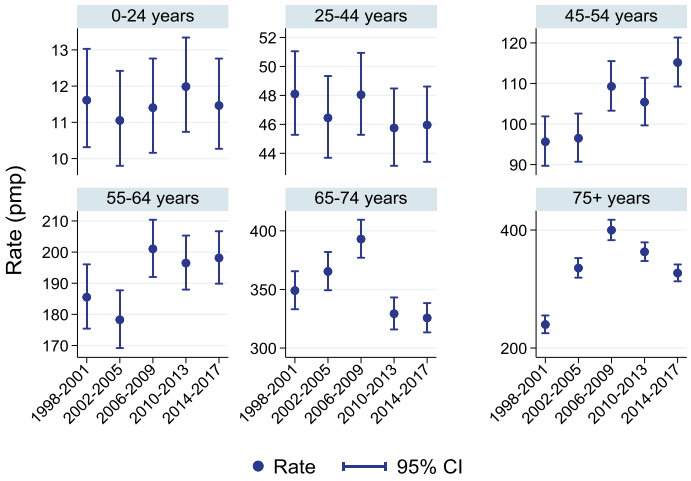
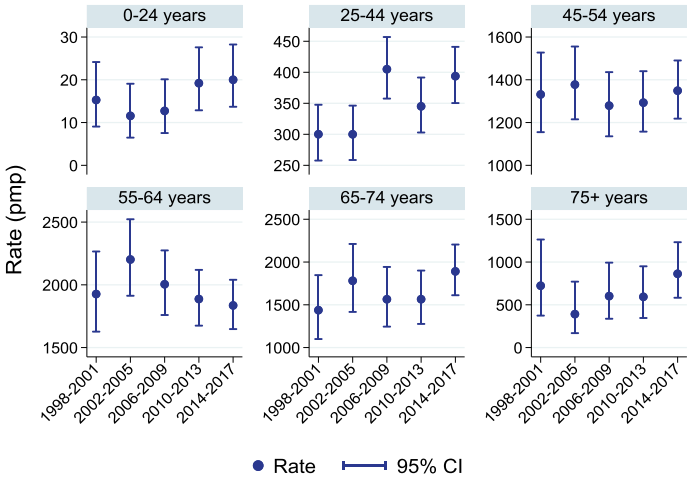


Figure 10.6.2 - Age-specific Incidence Rates of Treated ESKD - Indigenous, Australia. Note the Y axis scales vary between panels.



Age specific trends in renal replacement therapy practices for Māori and Pacific Peoples in New Zealand are shown in figure 10.7.

Figure 10.7.1 - Age-specific Incidence Rates of Treated ESKD - Non-Māori, non-Pacific, New Zealand. Note the Y axis scales vary between panels.

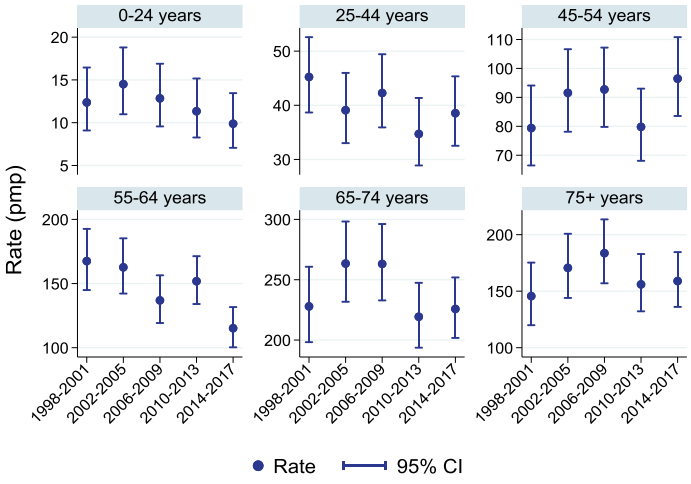


Figure 10.7.2 - Age-specific Incidence Rates of Treated ESKD - Māori, New Zealand. Note the Y axis scales vary between panels.

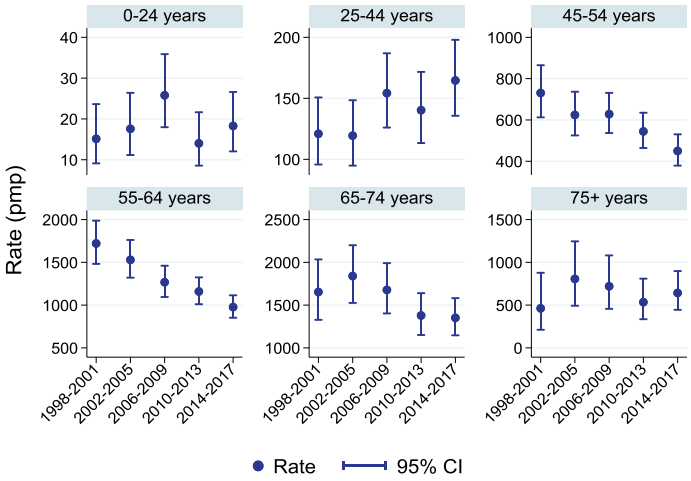
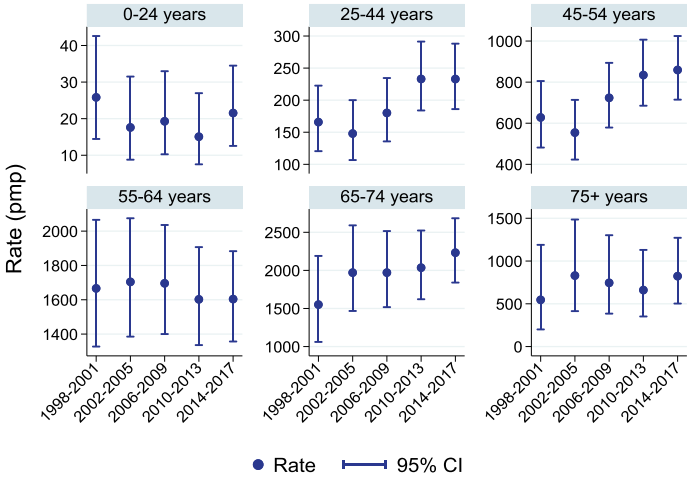


Figure 10.7.3 - Age-specific Incidence Rates of Treated ESKD - Pacific People, New Zealand. Note the Y axis scales vary between panels.



Prevalent Patients

The number of Indigenous Australians with treated end-stage kidney disease at the end of 2017 increased from 2006 persons in 2016 to 2161 persons (table 10.3).

There were marked differences in treatment modalities for Indigenous Australians (figures 10.8 and 10.10). Most Indigenous Australians were treated with facility-based haemodialysis (76%), with very few accessing home haemodialysis (6%), long-term peritoneal dialysis (6%), or kidney transplantation (13%). The proportion of Indigenous Australians with a kidney transplant as long-term treatment for end-stage kidney disease was 13% during 2017 compared with half (51%) of non-indigenous Australians. Only 6% of Indigenous Australians accessed home-based haemodialysis compared with 11% of non-indigenous Australians.

The number of prevalent Māori and Pacific patients with treated end-stage kidney disease continues to rise year-on- year (table 10.3 and figures 10.9 and 10.10)). From 2016 to 2017, there were notable increases in the numbers of Maori and Pacific People receiving peritoneal dialysis or with a kidney transplant.

Table 10.3 Prevalent Patients by Ethnicity and Treatment Modality 2013-2017

Year	Modality	Australia		New Zealand		
		Non-indigenous	Indigenous	Non-Māori, non-Pacific	Māori	Pacific People
2013	HD	8195 (41%)	1335 (79%)	661 (27%)	567 (57%)	533 (72%)
	% HD at home	13%	8%	34%	25%	20%
	PD	2150 (11%)	155 (9%)	437 (18%)	286 (29%)	111 (15%)
	Tx	9442 (48%)	205 (12%)	1330 (55%)	149 (15%)	94 (13%)
2014	HD	8273 (40%)	1449 (80%)	682 (28%)	611 (59%)	572 (72%)
	% HD at home	13%	8%	34%	23%	20%
	PD	2330 (11%)	149 (8%)	434 (18%)	270 (26%)	116 (15%)
	Tx	9827 (48%)	219 (12%)	1361 (55%)	160 (15%)	105 (13%)
2015	HD	8440 (40%)	1540 (81%)	695 (27%)	637 (61%)	573 (70%)
	% HD at home	13%	7%	31%	22%	22%
	PD	2342 (11%)	132 (7%)	438 (17%)	231 (22%)	126 (15%)
	Tx	10188 (49%)	236 (12%)	1407 (55%)	174 (17%)	118 (14%)
2016	HD	8502 (40%)	1616 (81%)	696 (27%)	662 (61%)	564 (68%)
	% HD at home	12%	6%	29%	21%	22%
	PD	2253 (11%)	132 (7%)	448 (17%)	233 (21%)	143 (17%)
	Tx	10690 (50%)	258 (13%)	1451 (56%)	192 (18%)	127 (15%)
2017	HD	8678 (39%)	1748 (81%)	678 (26%)	658 (59%)	575 (64%)
	% HD at home	11%	6%	28%	21%	19%
	PD	2230 (10%)	140 (6%)	434 (17%)	254 (23%)	162 (18%)
	Tx	11259 (51%)	273 (13%)	1507 (58%)	206 (18%)	164 (18%)

Figure 10.8.1 - Prevalent Patients by Modality - Australia - Indigenous

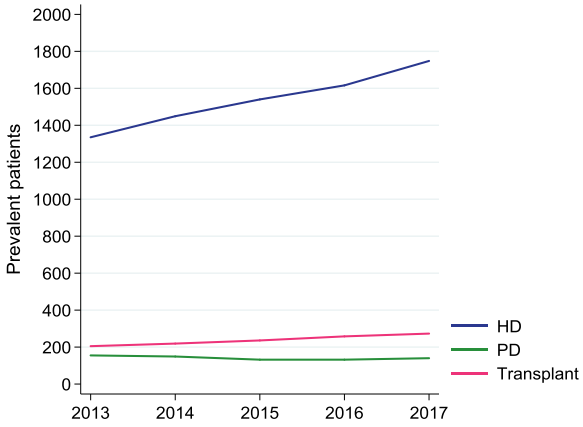


Figure 10.8.2 - Prevalent Patients by Modality - Australia - Non-indigenous

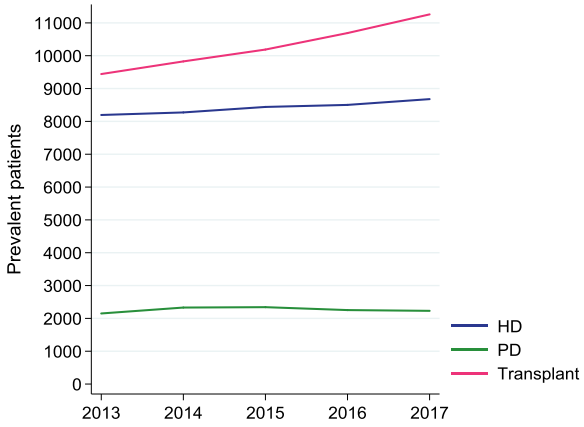


Figure 10.9.1 - Prevalent Patients by Modality - New Zealand – Māori

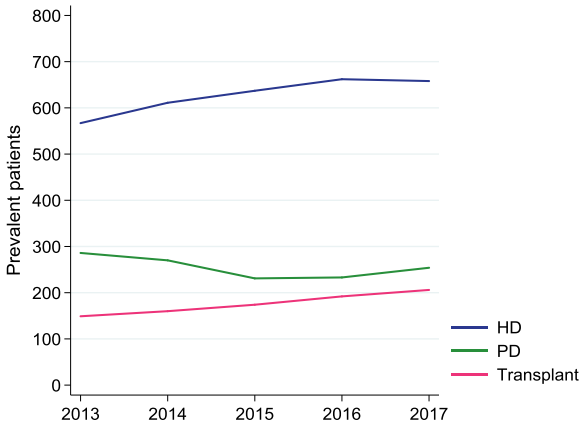


Figure 10.9.2 - Prevalent Patients by Modality - New Zealand – Pacific

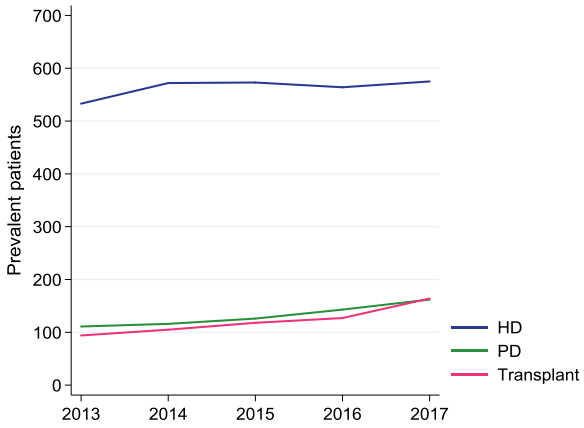


Figure 10.9.3 - Prevalent Patients by Modality - New Zealand - Non-Māori, non-Pacific

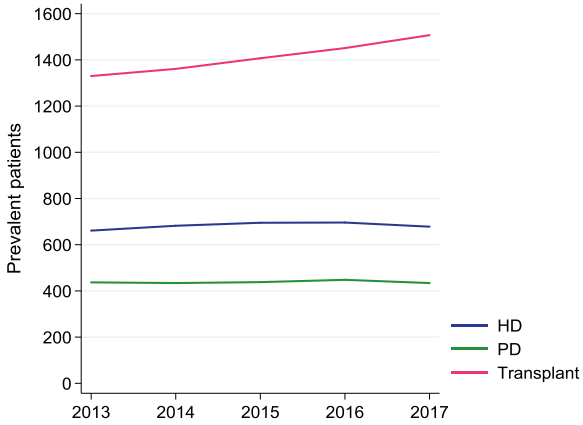


Figure 10.10.1 - Prevalent Haemodialysis at Home by Ethnicity - Australia

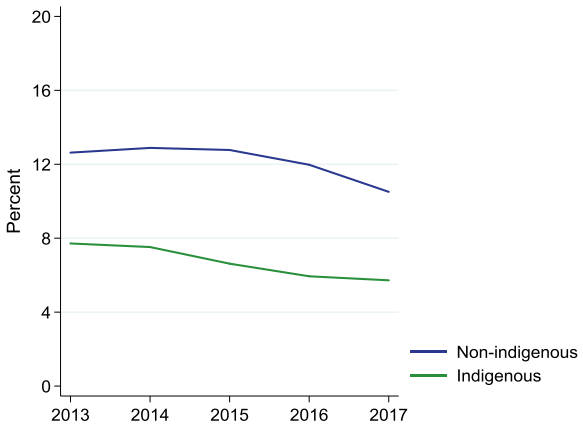
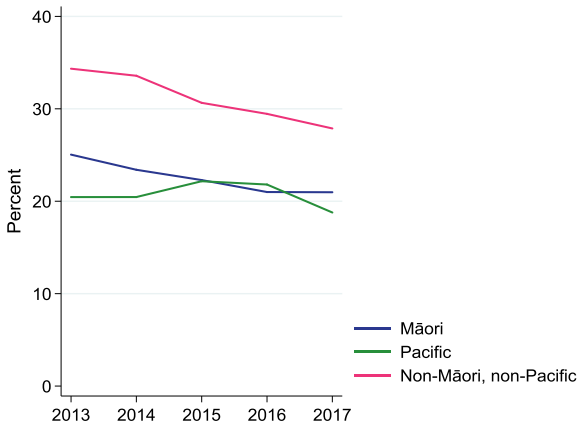


Figure 10.10.2 - Prevalent Haemodialysis at Home by Ethnicity - New Zealand



Transplantation

In both Australia and New Zealand, the proportion of Indigenous patients who receive a kidney transplant is very low (table 10.4). Information on donor type is shown in figures 10.11 and 10.12 and trends are shown in figure 10.13. There are substantially lower rates of living donation for Indigenous Australians. Living donor rates have increased for Māori patients since 2013, with increases in living unrelated donors.

Table 10.4 Number of Transplant Recipients (pmp) by Ethnicity 2008-2017

Year	Donor Type	Australia		New Zealand		
		Non-indigenous	Indigenous	Non-Māori, non-Pacific	Māori	Pacific People
2008	**DD**	435 (21)	24 (38)	42 (13)	5 (8)	6 (20)
2008	**LD**	347 (17)	7 (11)	57 (17)	8 (12)	4 (13)
2008	**Total**	**782 (38)**	**31 (49)**	**99 (30)**	**13 (20)**	**10 (33)**
2009	**DD**	426 (20)	20 (31)	39 (12)	10 (15)	5 (16)
2009	**LD**	323 (15)	4 (6)	58 (17)	8 (12)	1 (3)
2009	**Total**	**749 (36)**	**24 (37)**	**97 (29)**	**18 (27)**	**6 (19)**
2010	**DD**	522 (24)	28 (43)	32 (10)	13 (20)	5 (16)
2010	**LD**	296 (14)	0 (0)	49 (15)	7 (11)	4 (12)
2010	**Total**	**818 (38)**	**28 (43)**	**81 (24)**	**20 (30)**	**9 (28)**
2011	**DD**	544 (25)	26 (39)	39 (12)	15 (22)	7 (21)
2011	**LD**	252 (12)	2 (3)	49 (14)	6 (9)	2 (6)
2011	**Total**	**796 (37)**	**28 (42)**	**88 (26)**	**21 (31)**	**9 (27)**
2012	**DD**	587 (27)	20 (29)	37 (11)	11 (16)	6 (18)
2012	**LD**	233 (11)	0 (0)	49 (14)	4 (6)	1 (3)
2012	**Total**	**820 (37)**	**20 (29)**	**86 (25)**	**15 (22)**	**7 (21)**
2013	**DD**	598 (27)	30 (43)	45 (13)	5 (7)	6 (17)
2013	**LD**	249 (11)	1 (1)	53 (16)	4 (6)	2 (6)
2013	**Total**	**847 (38)**	**31 (44)**	**98 (29)**	**9 (13)**	**8 (23)**
2014	**DD**	605 (27)	37 (52)	44 (13)	13 (19)	9 (26)
2014	**LD**	252 (11)	4 (6)	56 (16)	9 (13)	7 (20)
2014	**Total**	**857 (38)**	**41 (57)**	**100 (29)**	**22 (31)**	**16 (45)**
2015	**DD**	664 (29)	33 (45)	44 (12)	13 (18)	16 (44)
2015	**LD**	223 (10)	3 (4)	54 (15)	15 (21)	5 (14)
2015	**Total**	**887 (38)**	**36 (49)**	**98 (28)**	**28 (39)**	**21 (58)**
2016	**DD**	776 (33)	32 (43)	57 (16)	12 (17)	18 (49)
2016	**LD**	227 (10)	2 (3)	56 (16)	13 (18)	10 (27)
2016	**Total**	**1003 (43)**	**34 (46)**	**113 (31)**	**25 (35)**	**28 (75)**
2017	**DD**	783 (33)	32 (42)	70 (19)	17 (23)	29 (76)
2017	**LD**	254 (11)	2 (3)	51 (14)	6 (8)	11 (29)
2017	**Total**	**1037 (44)**	**34 (44)**	**121 (33)**	**23 (31)**	**40 (105)**

Over the period 2008-2017 there has been a gradual increase in the number of deceased donor transplants overall, but this trend is less clear in the Australian Indigenous patients (figure 10.11). Numbers from living donors remain extremely low.

The number of transplants to Māori and Pacific Peoples recipients increased in 2014-16. In contrast to the situation in Australia, there is a higher proportion of transplants from living donors.

Figure 10.11 - Donor Type by Ethnicity - Australia 2008-2017

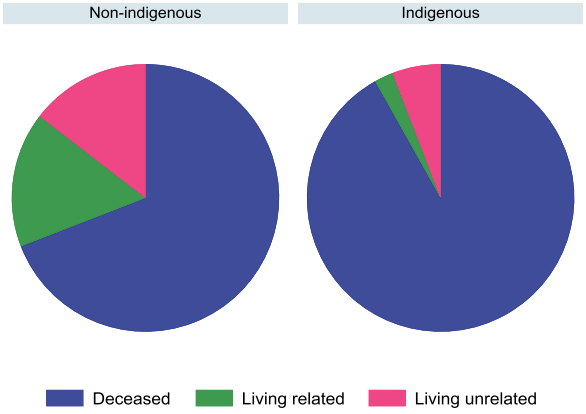


Figure 10.12 - Donor Type by Ethnicity - New Zealand 2008-2017

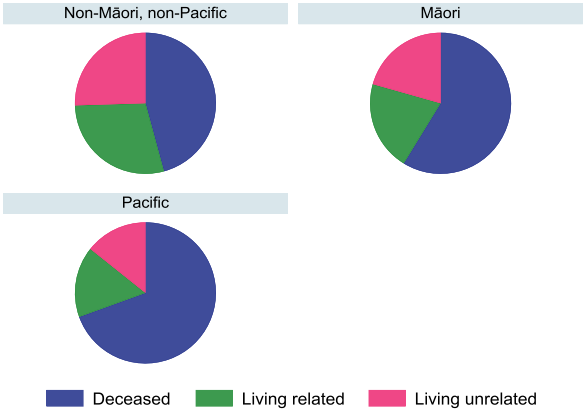


Figure 10.13.1 - Donor Type - Australia

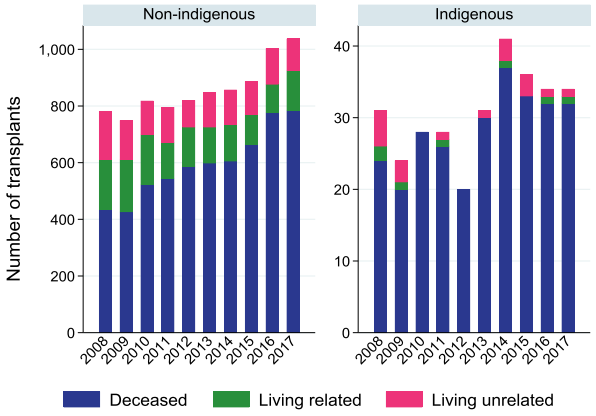


Figure 10.13.2 - Donor Type - New Zealand

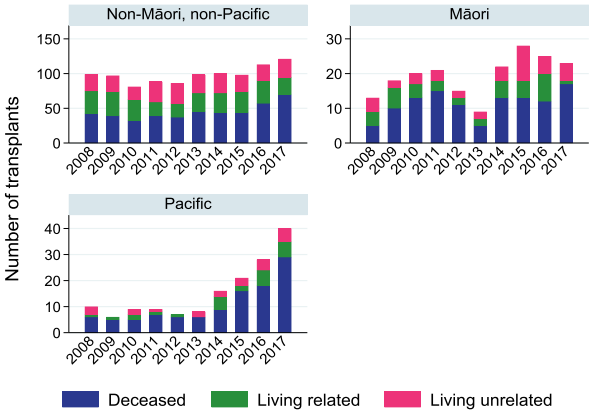


Figure 10.14.1 - Percentage of Patients Starting RRT with Pre-emptive Kidney Transplant - Australia

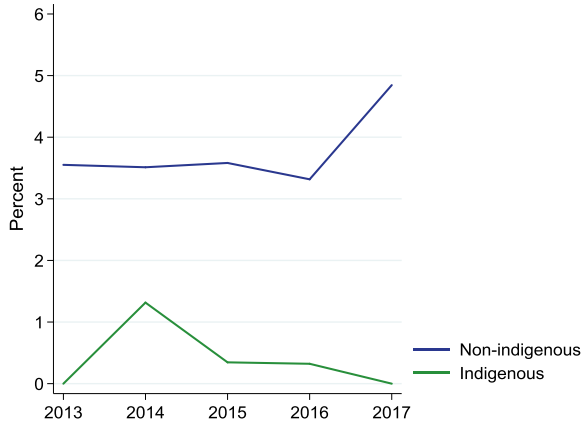
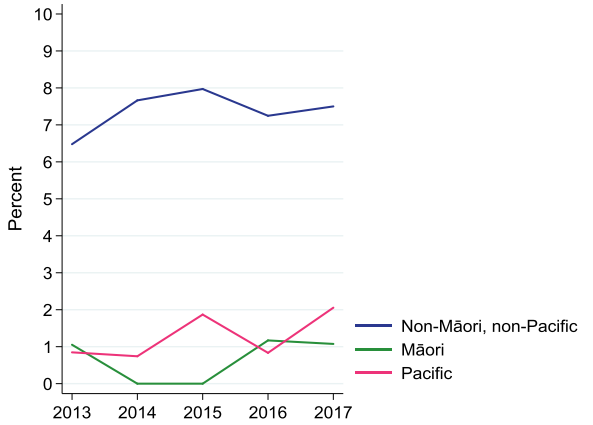


Figure 10.14.2 - Percentage of Patients Starting RRT with Pre-emptive Kidney Transplant - New Zealand



Transplant Survival

There is a difference in survival after kidney transplantation from a deceased donor between non-indigenous and Indigenous recipients, which is apparent from 1.5 years after transplantation. At 5 years post-transplant, 84% of Indigenous Australians and 90% of non-indigenous persons were alive 5 years after kidney transplantation from a deceased donation (figure 10.15.1).

Figure 10.15.1 - Primary DD Graft Patient Survival 2008-2017 - Australia

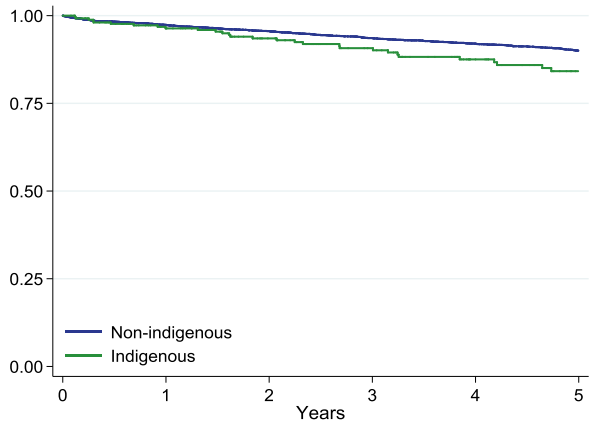
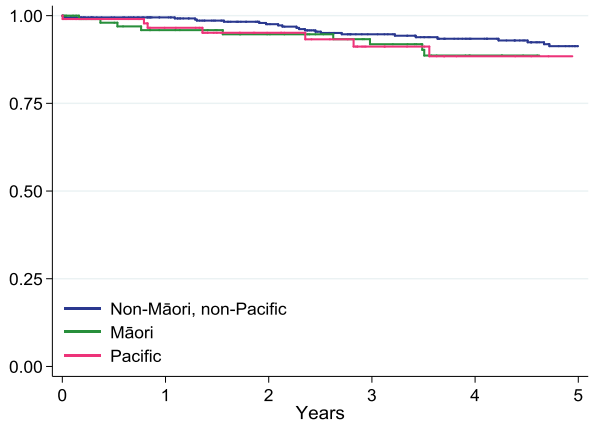


Figure 10.15.2 - Primary DD Graft Patient Survival 2008-2017 - New Zealand



Every year, over the first 5 years after kidney transplant from a deceased donation, some kidney transplants have been lost either through the transplant failing or the patient dying with a functioning kidney. In the first year, there was no difference in the proportions of Indigenous and non-indigenous recipients who experienced graft loss. Transplant kidney function at 5 years post-transplant was recorded in 71% of Indigenous recipients compared with 83% of non-indigenous persons (figure 10.16.1).

Non-Māori, non-Pacific patients experienced better graft and patient 5-year survival after deceased kidney donation (figure 10.16.2).

Figure 10.16.1 - Primary DD Overall Graft Survival 2008-2017 - Australia

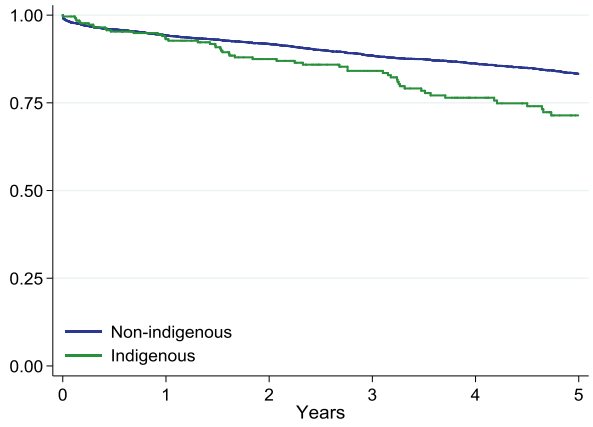
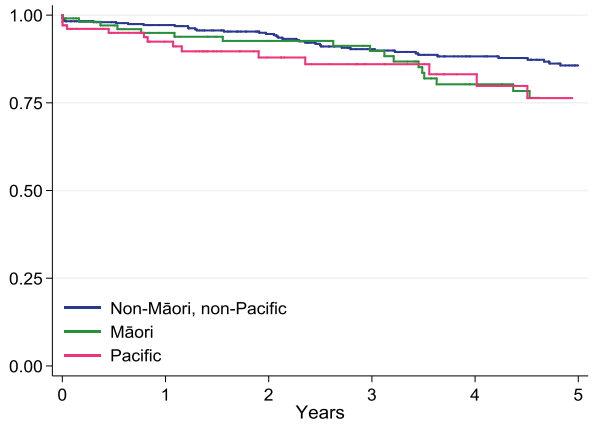


Figure 10.16.2 - Primary DD Overall Graft Survival 2008-2017 - New Zealand



Cumulative incidence curves (utilising competing risk techniques to account for the effects of both components of graft failure) are shown for Indigenous transplant outcomes in figure 10.17.

For Indigenous Australians, there are markedly higher rates of transplant loss, particularly evident at 3 years after transplantation. Indigenous Australians experience higher mortality rates throughout the first five years after transplantation. The difference in survival worsens over time.

For Māori, mortality is increased immediately after transplantation, while graft survival, at least in the first 3 years, appears to be comparable with non-Māori, non-Pacific patients. Pacific patients experience graft loss at a higher rate particularly after 18 months of transplantation.

Figure 10.17.1 - Transplant Outcomes, Australia - Primary Deceased Donor Kidney-only Transplants 2008-2017

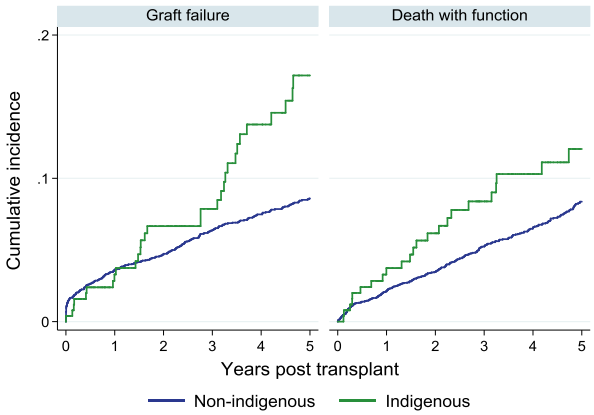
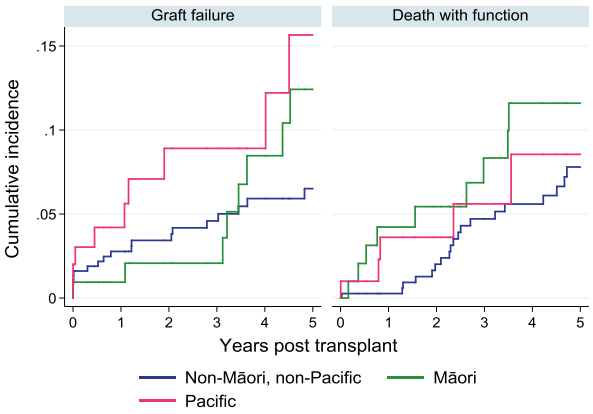


Figure 10.17.2 - Transplant Outcomes, New Zealand - Primary Deceased Donor Kidney-only Transplants 2008-2017



Dialysis

The distribution of dialysis modality is shown graphically in figure 10.18. For Indigenous Australians (figure 10.18.1), the predominant modality is satellite haemodialysis. Access to home-based dialysis care including both haemodialysis and peritoneal dialysis is proportionally much lower. Indigenous Australians utilise automated peritoneal dialysis (APD) at much lower rates than non-indigenous Australians.

Data are shown for New Zealand in figure 10.18.2. Māori and Pacific patients have a higher use of facility dialysis as the principal modality of care. For Māori, there is lower use of CAPD. Home based haemodialysis rates appear similar for all populations. For Pacific patients, peritoneal dialysis is used much less frequently than home and facility-based haemodialysis. For non-Māori, non-Pacific patients, over half have home-based care. The proportion of Māori and Pacific patients receiving home-based dialysis is approximately 10-20% lower.

Figure 10.18.1 - Dialysis Modality End 2017 - Australia, by Ethnicity

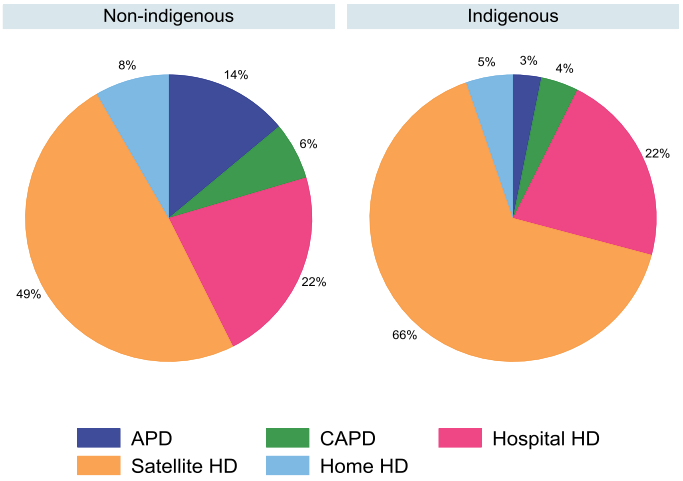
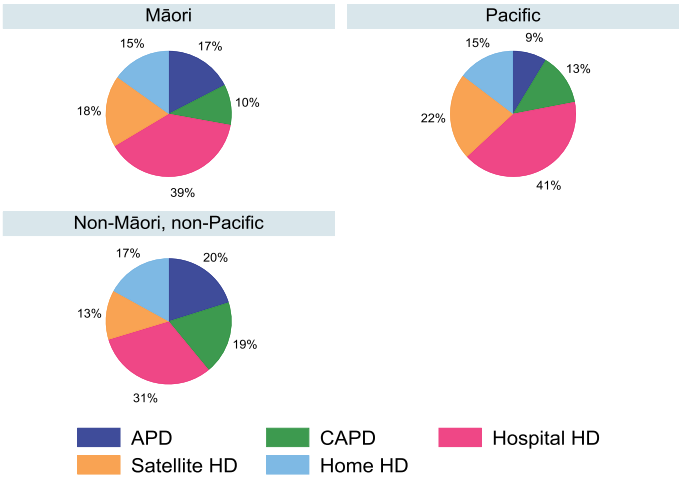


Figure 10.18.2 - Dialysis Modality End 2017 - New Zealand, by Ethnicity



Half of the people who started dialysis over 2008-2017 were alive 5 years later (figure 10.19). This was a similar result for Indigenous and non-indigenous patients. Non-Māori-non-Pacific and Māori cohorts experienced similar survival over 5 years after starting dialysis, although it is possible that differences between populations including age distribution and access to competing treatments (transplantation) may have impacted mortality estimates.

Figure 10.19.1 - Incident Dialysis Patient Survival 2008-2017 - Australia

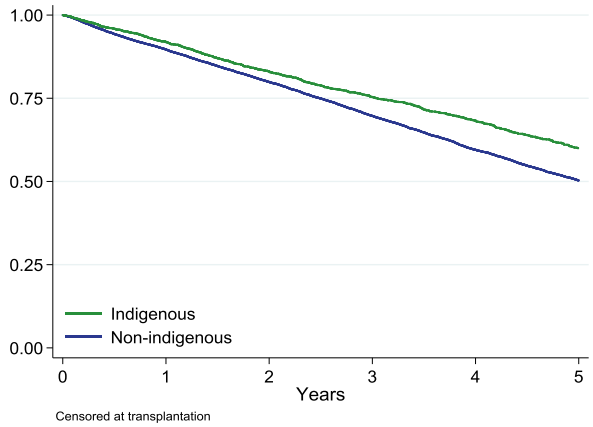
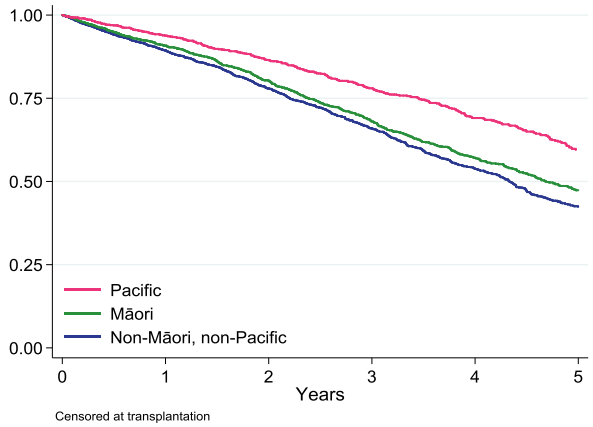


Figure 10.19.2 - Incident Dialysis Patient Survival 2008-2017 - New Zealand



Timing of Renal Replacement Therapy Initiation

In Australia, the level of kidney function at which dialysis is commenced ranges between eGFR 5-6 mL/min/1.73m^2 for Indigenous Australians while the kidney function at dialysis commencement for non-indigenous Australians is approximately 7 mL/min/1.73m^2. For Aotearoa/New Zealand, the estimated GFR at dialysis commencement is approximately 4-5 mL/min/1.73m^2 for Pacific patients, 5-7 mL/min/1.73m^2 for Māori patients and 6-7 mL/min/1.73m^2 for non-Māori, non-Pacific patients.

Figure 10.20.1 - eGFR at RRT start - Australia

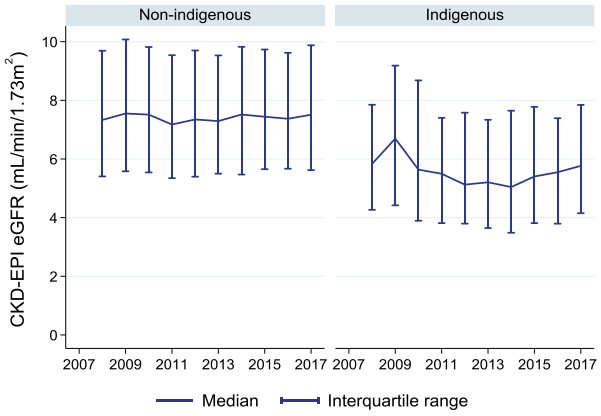
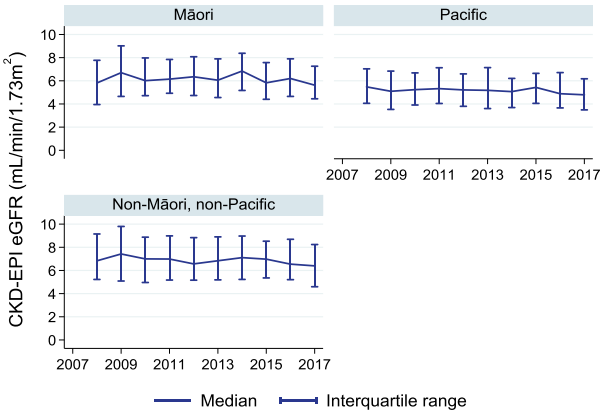


Figure 10.20.2 - eGFR at RRT start - New Zealand



Incidence and Prevalence by State

The next few pages show a variety of figures that summarise various key rates (incidence, prevalence, transplant rates) for Indigenous Australians and by ethnicity in New Zealand. In large part they show information from previous pages, in a series of differing formats.

State Incidence

There is marked variation in the incidence of renal replacement therapy between States and Territories in Australia. NT had the highest national incidence for Indigenous Australians treated for end-stage kidney disease at 1344 per million of population in 2017; the next highest was in WA (830 pmp) (figure 10.21).

Kidney transplantation is offered in major metropolitan centres in NSW, QLD, WA, VIC and SA. As indicated in figure 10.11, the majority of kidney transplantations available to Indigenous Australians are derived from deceased donors. There is a marked State/Territory variation in the incidence of kidney transplantation in Australia and between years (figure 10.22). Both NT and SA had peak transplantation incidence in 2014 which were not sustained. For the NT, transplantation incidence represents approximately one tenth of the incidence in new patients commencing dialysis.

Figure 10.21 - Incidence of New Indigenous Australian Patients

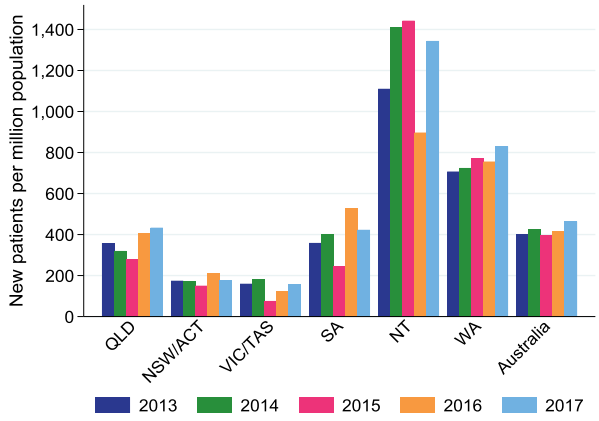
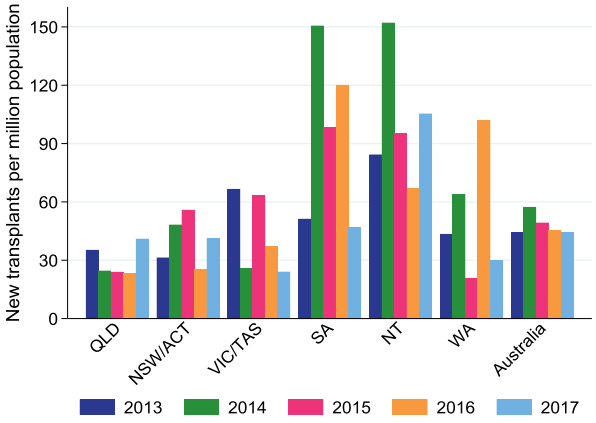
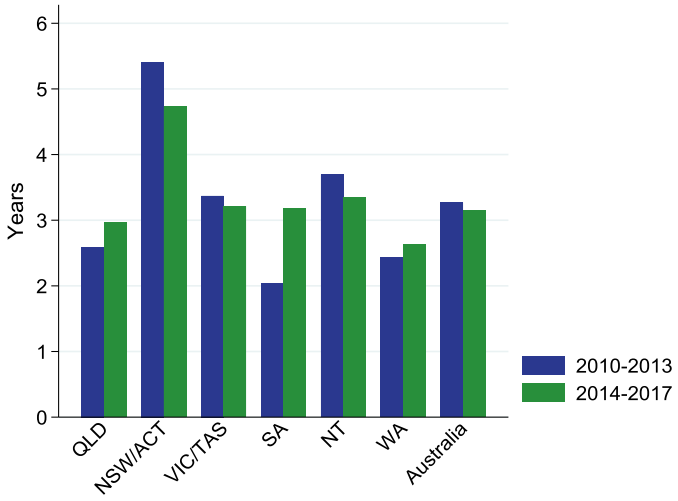


Figure 10.22 - Incidence of New Transplants Indigenous Australian Patients - By referring state



The time from commencement of dialysis to receipt of first transplant is shown in figure 10.23, with varying patterns between different states and territories.

Figure 10.23 - Median Time to Primary Transplant Indigenous Australian Patients - By referring state, Transplants during 2010-2013 vs 2014-2017



Dialysis by Resident State

Treatment patterns for Aboriginal and Torres Strait Islander People vary by state. The highest rates for hemodialysis are in the Northern Territory, Western Australia and South Australia. The highest rates for peritoneal dialysis are in Queensland, Western Australia and the Northern Territory.

Figure 10.24 - Prevalent Indigenous Australian Haemodialysis Patients

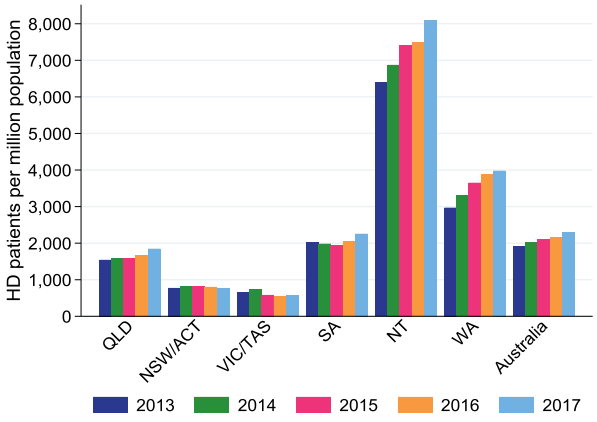
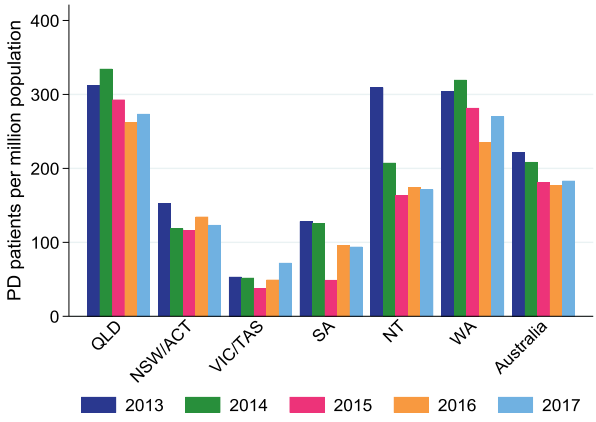


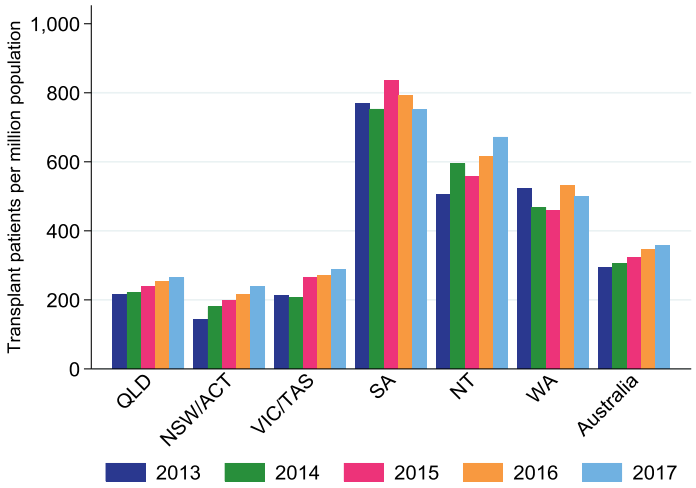
Figure 10.25 - Prevalent Indigenous Australian Peritoneal Dialysis Patients



Transplantation by Referring State

Rates of prevalent transplants vary substantially between states with the highest rates in South Australia, Western Australian and Northern Territory. These rates are per population, not per dialysis patient, and they reflect both background rates of kidney disease and transplant practices. Transplant rates per dialysis patient are presented in Chapter 7 of this Report. Transplantation prevalence appears to be increasing in some but not all jurisdictions, although there are no areas of clear decline (figure 10.26).

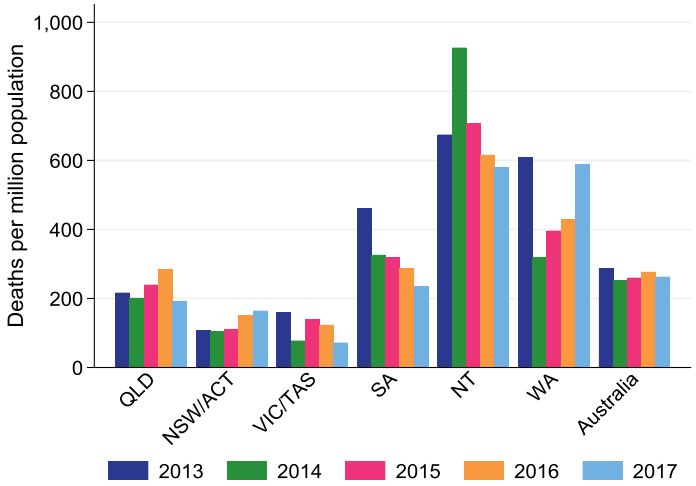
Figure 10.26 - Prevalent Indigenous Australian Transplant Patients



Deaths by Resident State

State based mortality rates for Indigenous Australians on renal replacement therapy are shown in figure 10.27. The differences in death rates between states are likely to reflect a combination of the differences in ESKD prevalence, practice patterns and patient factors.

Figure 10.27 - Deaths of Indigenous Australian RRT patients



Aotearoa/New Zealand

Figure 10.28 - Incidence of New Patients - New Zealand

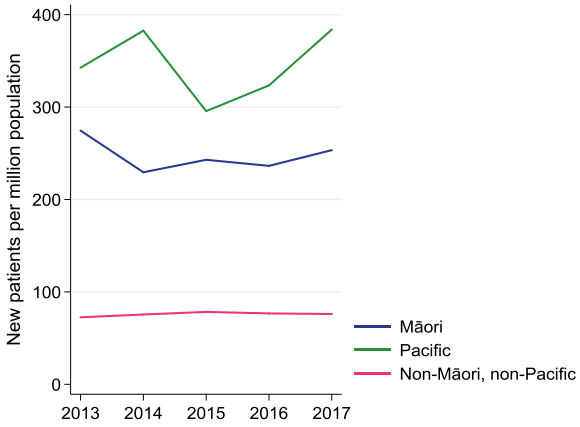


Figure 10.29 - Incidence of New Transplants - New Zealand

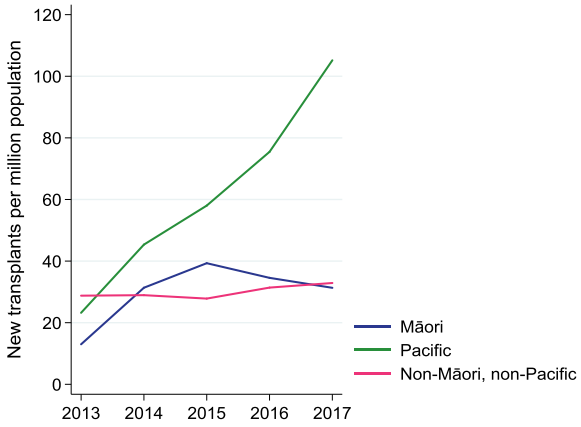


Figure 10.30 - Prevalent Haemodialysis Patients - New Zealand

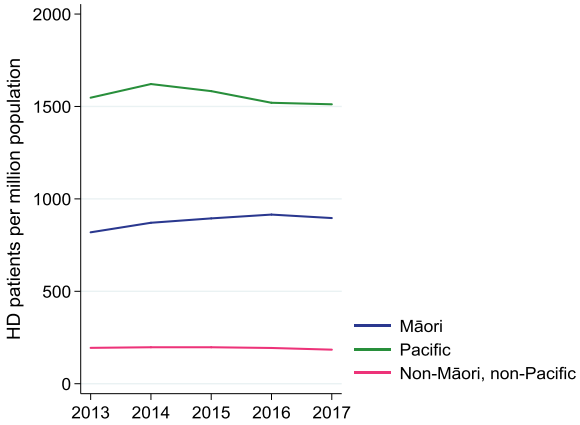


Figure 10.31 - Prevalent Peritoneal Dialysis Patients - New Zealand

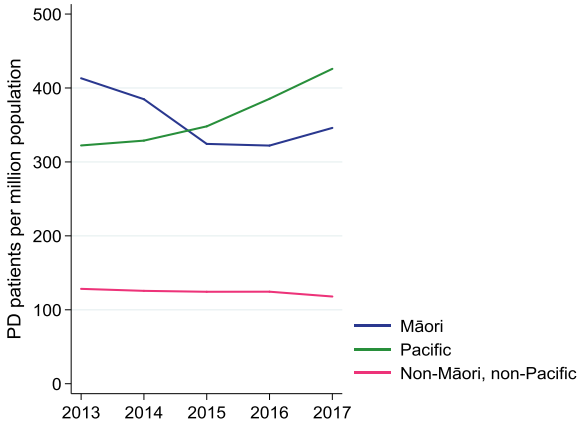


Figure 10.32 - Prevalent Transplant Patients - New Zealand

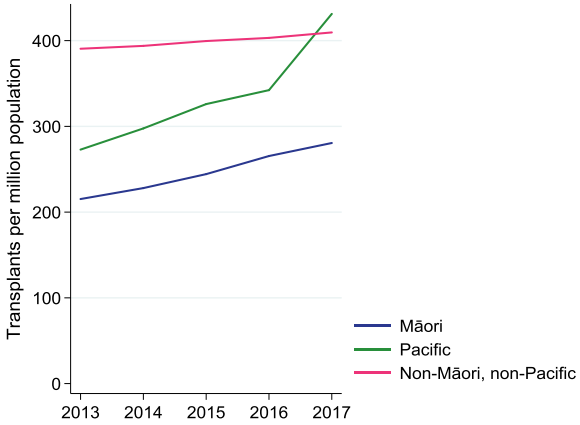
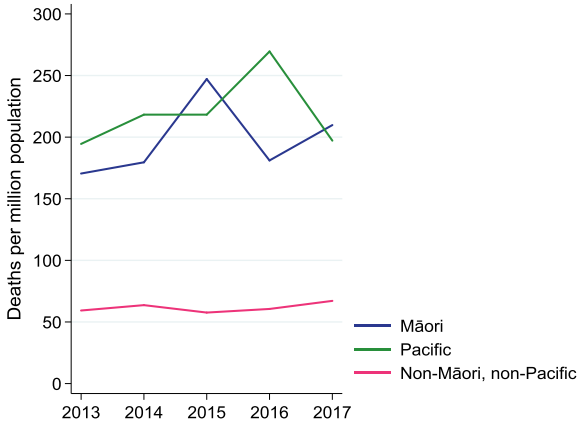


Figure 10.33 - Deaths of RRT Patients - New Zealand



Geographical Distribution

Figure 10.34 shows the number of incident Indigenous Australian patients by postcode. The distribution of prevalent dialysis patients is summarised in figure 10.35 (by state) and 10.36 by statistical area level 3 (SA3, obtained by mapping postcodes to SA3). Note that some postcodes are distributed over more than one SA3. Mapping data are based on the 2016 Australian Statistical Geography Standard courtesy of the Australian Bureau of Statistics (2016)[1].

Figure 10.34 - Incident Indigenous Australian Patients 2013-2017 - By Postcode

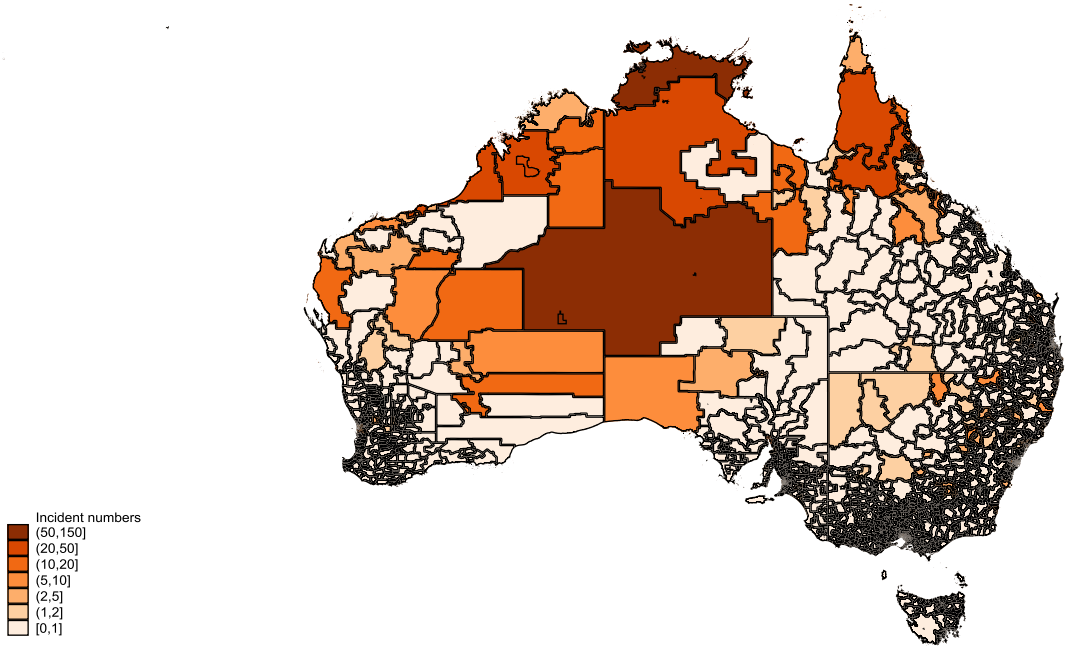


Figure 10.35 - Prevalent Indigenous Australian Patients 2017 - By State

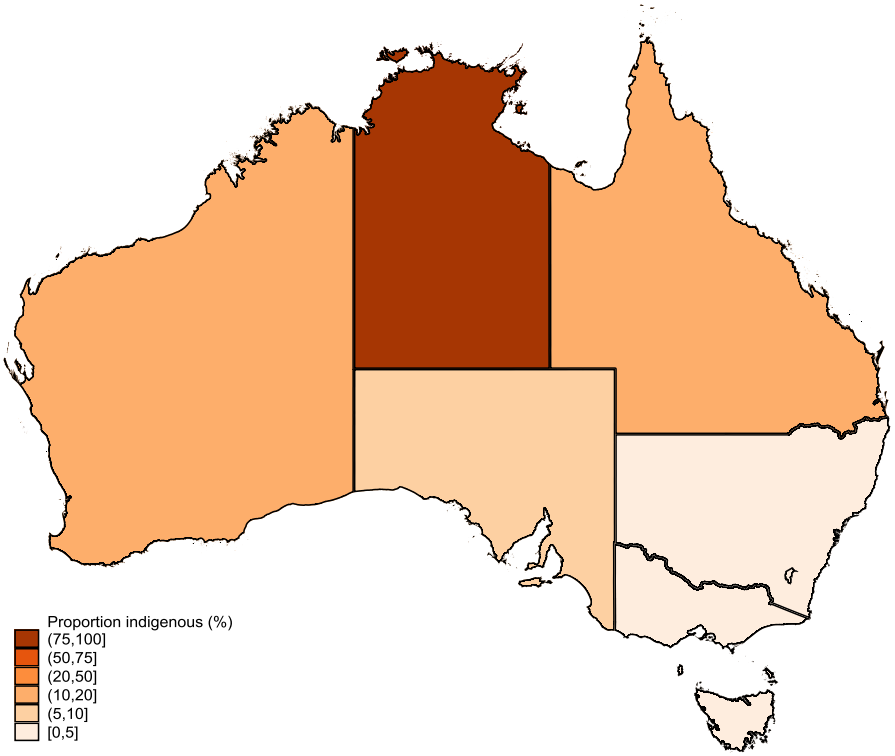
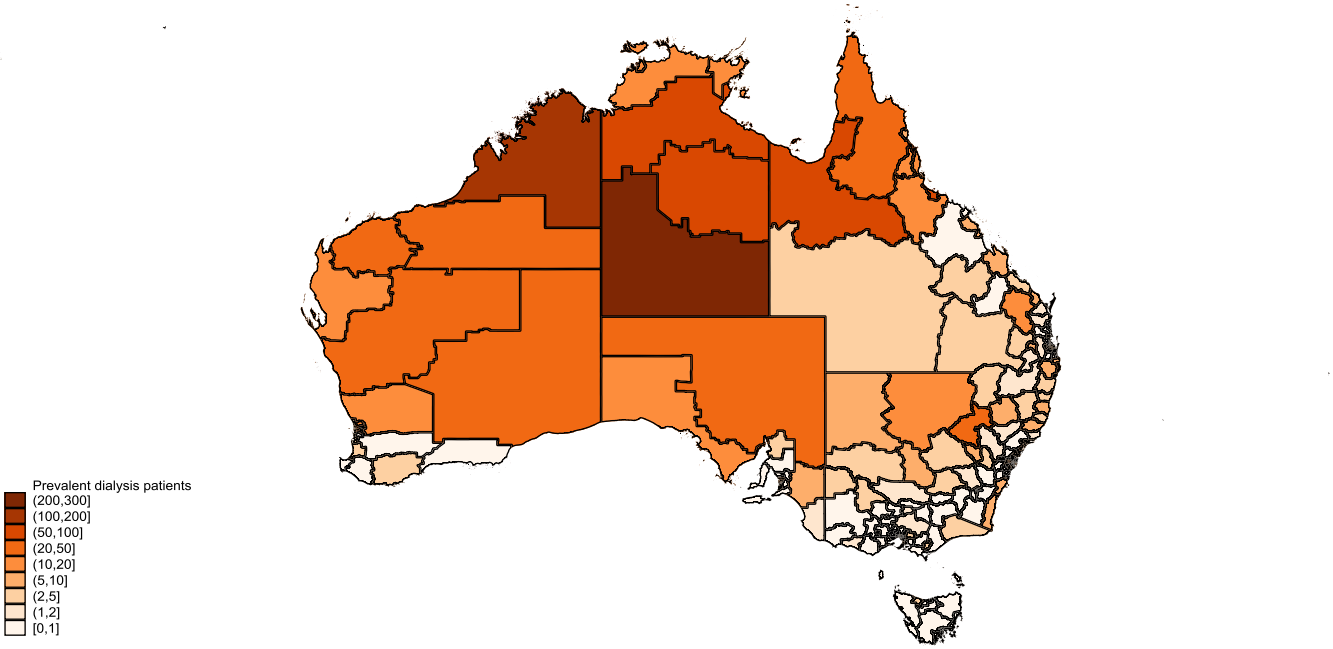


Figure 10.36 - Prevalent Indigenous Australian Dialysis Patients 2017 - By Statistical Area Level 3



Late Referral

The percentage of Indigenous Australians referred late for treatment has been stable over 2013-2017 (table 10.5).

The proportion of patients who experience late referral to specialist nephrology services in Aotearoa/New Zealand appears to be decreasing over time.

Table 10.5 Percentage of Late Referral by Ethnicity 2013-2017

Year	Australia		New Zealand		
	Non-indigenous	Indigenous	Non-Māori, non-Pacific	Māori	Pacific People
2013	19%	18%	11%	15%	22%
2014	18%	15%	14%	8%	20%
2015	18%	17%	13%	16%	11%
2016	19%	14%	13%	13%	18%
2017	18%	17%	11%	14%	9%

Vascular Access

Incident Vascular Access

Incident vascular access data are presented in table 10.6, and prevalent data in table 10.7.

For Australia, the proportion of Indigenous patients commencing RRT with heamodialysis using a catheter rather than permanent access was slightly higher than in non-indigenous patients in 2017 (table 10.6). In New Zealand rates of catheter use are slightly lower for Māori and Pacific patients.

Table 10.6 Incident Vascular Access 2013-2017

Year	Vascular access	Australia		New Zealand		
		Non-indigenous	Indigenous	Non-Māori, non-Pacific	Māori	Pacific People
2013	AVF	624 (40%)	66 (28%)	47 (35%)	38 (30%)	25 (27%)
	AVG	30 (2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	CVC	893 (57%)	169 (71%)	85 (63%)	88 (69%)	68 (73%)
	Not reported	28 (2%)	3 (1%)	4 (3%)	2 (2%)	0 (0%)
2014	AVF	672 (43%)	87 (33%)	38 (28%)	41 (37%)	25 (24%)
	AVG	24 (2%)	4 (2%)	2 (1%)	2 (2%)	2 (2%)
	CVC	847 (54%)	164 (62%)	93 (69%)	65 (59%)	78 (74%)
	Not reported	35 (2%)	9 (3%)	1 (1%)	2 (2%)	0 (0%)
2015	AVF	675 (43%)	93 (37%)	34 (27%)	34 (28%)	25 (38%)
	AVG	26 (2%)	5 (2%)	2 (2%)	3 (2%)	0 (0%)
	CVC	839 (53%)	151 (60%)	87 (69%)	81 (67%)	40 (62%)
	Not reported	30 (2%)	2 (1%)	3 (2%)	3 (2%)	0 (0%)
2016	AVF	657 (41%)	105 (39%)	33 (23%)	31 (29%)	23 (27%)
	AVG	20 (1%)	1 (<1%)	1 (1%)	0 (0%)	1 (1%)
	CVC	901 (56%)	162 (60%)	104 (73%)	75 (69%)	62 (72%)
	Not reported	21 (1%)	0 (0%)	4 (3%)	2 (2%)	0 (0%)
2017	AVF	746 (42%)	113 (37%)	31 (21%)	30 (25%)	27 (27%)
	AVG	19 (1%)	9 (3%)	2 (1%)	3 (2%)	1 (1%)
	CVC	997 (56%)	184 (60%)	113 (77%)	89 (73%)	71 (71%)
	Not reported	11 (1%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)

Prevalent Vascular Access

In contrast to incident vascular access, the rates of catheter use for prevalent dialysis patients in Australia are lower for Indigenous patients in 2017 than non-indigenous patients (table 10.7). In New Zealand rates of catheter use are slightly lower for Māori and Pacific patients.

Table 10.7 Prevalent Vascular Access 2013-2017

Year	Vascular access	Australia		New Zealand		
		Non-indigenous	Indigenous	Non-Māori, non-Pacific	Māori	Pacific People
2013	AVF	6327 (77%)	1073 (80%)	459 (69%)	404 (71%)	403 (76%)
	AVG	589 (7%)	41 (3%)	39 (6%)	30 (5%)	18 (3%)
	CVC	1167 (14%)	202 (15%)	158 (24%)	130 (23%)	110 (21%)
	Not reported	112 (1%)	19 (1%)	5 (1%)	3 (1%)	2 (<1%)
2014	AVF	6270 (76%)	1147 (79%)	459 (67%)	457 (75%)	428 (75%)
	AVG	647 (8%)	45 (3%)	36 (5%)	29 (5%)	16 (3%)
	CVC	1099 (13%)	187 (13%)	169 (25%)	117 (19%)	122 (21%)
	Not reported	257 (3%)	70 (5%)	18 (3%)	8 (1%)	6 (1%)
2015	AVF	6369 (75%)	1183 (77%)	453 (65%)	428 (67%)	431 (75%)
	AVG	560 (7%)	47 (3%)	27 (4%)	35 (5%)	26 (5%)
	CVC	1110 (13%)	176 (11%)	183 (26%)	140 (22%)	107 (19%)
	Not reported	401 (5%)	134 (9%)	32 (5%)	34 (5%)	9 (2%)
2016	AVF	6334 (75%)	1249 (77%)	447 (64%)	452 (68%)	409 (73%)
	AVG	463 (5%)	50 (3%)	27 (4%)	27 (4%)	25 (4%)
	CVC	1157 (14%)	164 (10%)	204 (29%)	167 (25%)	124 (22%)
	Not reported	548 (6%)	153 (9%)	18 (3%)	16 (2%)	6 (1%)
2017	AVF	6659 (77%)	1383 (79%)	421 (62%)	447 (68%)	414 (72%)
	AVG	434 (5%)	53 (3%)	20 (3%)	26 (4%)	14 (2%)
	CVC	1351 (16%)	206 (12%)	219 (32%)	176 (27%)	142 (25%)
	Not reported	234 (3%)	106 (6%)	18 (3%)	9 (1%)	5 (1%)

Patient Flow

Table 10.8.1 shows the overall flow of Indigenous Australian patients, by state. For new and pre-emptive transplants, numbers are shown by referring state. The differences in death rates between states are likely to reflect a combination of the differences in ESKD prevalence, practice patterns and patient factors.

Table 10.8.1 Patient Flow (pmp) Australian Indigenous Patients 2013-2017

Year	Event	QLD	NSW/ACT	VIC/TAS	SA	NT	WA	Australia
	New patients	71 (358)	39 (175)	12 (160)	14 (359)	79 (1111)	65 (707)	**280 (401)**
	New transplants	7 (35)	7 (31)	5 (67)	2 (51)	6 (84)	4 (44)	**31 (44)**
	Pre-emptive transplants	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	**0 (0)**
2013	**Prevalent dialysis**	368 (1856)	207 (927)	53 (707)	84 (2154)	477 (6706)	301 (3274)	**1490 (2132)**
	Prevalent transplants	43 (217)	32 (143)	16 (213)	30 (769)	36 (506)	48 (522)	**205 (293)**
	Total prevalence	411 (2073)	239 (1071)	69 (920)	114 (2923)	513 (7212)	349 (3796)	**1695 (2425)**
	Deaths	43 (217)	24 (108)	12 (160)	18 (462)	48 (675)	56 (609)	**201 (288)**
	New patients	65 (320)	39 (171)	14 (182)	16 (402)	102 (1411)	68 (725)	**304 (426)**
	New transplants	5 (25)	11 (48)	2 (26)	6 (151)	11 (152)	6 (64)	**41 (57)**
	Pre-emptive transplants	0 (0)	4 (18)	0 (0)	0 (0)	0 (0)	0 (0)	**4 (6)**
2014	**Prevalent dialysis**	389 (1914)	213 (935)	60 (780)	84 (2109)	512 (7082)	340 (3623)	**1598 (2237)**
	Prevalent transplants	45 (221)	41 (180)	16 (208)	30 (753)	43 (595)	44 (469)	**219 (307)**
	Total prevalence	434 (2136)	254 (1115)	76 (988)	114 (2862)	555 (7677)	384 (4091)	**1817 (2544)**
	Deaths	41 (202)	24 (105)	6 (78)	13 (326)	67 (927)	30 (320)	**181 (253)**
	New patients	58 (278)	35 (150)	6 (76)	10 (246)	106 (1443)	74 (772)	**289 (396)**
	New transplants	5 (24)	13 (56)	5 (63)	4 (98)	7 (95)	2 (21)	**36 (49)**
	Pre-emptive transplants	0 (0)	1 (4)	0 (0)	0 (0)	0 (0)	0 (0)	**1 (1)**
2015	**Prevalent dialysis**	392 (1881)	216 (928)	49 (621)	81 (1990)	557 (7581)	377 (3933)	**1672 (2290)**
	Prevalent transplants	50 (240)	46 (198)	21 (266)	34 (835)	41 (558)	44 (459)	**236 (323)**
	Total prevalence	442 (2121)	262 (1126)	70 (888)	115 (2825)	598 (8138)	421 (4392)	**1908 (2613)**
	Deaths	50 (240)	26 (112)	11 (139)	13 (319)	52 (708)	38 (396)	**190 (260)**
	New patients	87 (407)	50 (210)	10 (124)	22 (529)	67 (897)	74 (756)	**310 (415)**
	New transplants	5 (23)	6 (25)	3 (37)	5 (120)	5 (67)	10 (102)	**34 (46)**
	Pre-emptive transplants	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (10)	**1 (1)**
2016	**Prevalent dialysis**	413 (1933)	223 (938)	48 (593)	89 (2139)	572 (7659)	403 (4116)	**1748 (2341)**
	Prevalent transplants	54 (253)	51 (215)	22 (272)	33 (793)	46 (616)	52 (531)	**258 (345)**
	Total prevalence	467 (2185)	274 (1153)	70 (865)	122 (2932)	618 (8275)	455 (4647)	**2006 (2686)**
	Deaths	61 (285)	36 (151)	10 (124)	12 (288)	46 (616)	42 (429)	**207 (277)**
	New patients	95 (433)	43 (177)	13 (156)	18 (423)	102 (1344)	83 (830)	**354 (463)**
	New transplants	9 (41)	10 (41)	2 (24)	2 (47)	8 (105)	3 (30)	**34 (44)**
	Pre-emptive transplants	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	**0 (0)**
2017	**Prevalent dialysis**	465 (2121)	218 (897)	53 (638)	100 (2350)	627 (8261)	425 (4249)	**1888 (2471)**
	Prevalent transplants	58 (265)	58 (239)	24 (289)	32 (752)	51 (672)	50 (500)	**273 (357)**
	Total prevalence	523 (2385)	276 (1136)	77 (927)	132 (3102)	678 (8933)	475 (4749)	**2161 (2828)**
	Deaths	42 (192)	40 (165)	6 (72)	10 (235)	44 (580)	59 (590)	**201 (263)**

Table 10.8.2 shows the overall patient flow in New Zealand by ethnicity. Notably, mortality for Māori and Pacific patients is 3 to 5-fold higher per million of population.

Table 10.8.2 Patient Flow (pmp) New Zealand 2013-2017

Year	Event	Non-Māori, non-Pacific	Māori	Pacific
2013	**New patients**	247 (73)	190 (274)	118 (343)
	New transplants	98 (29)	9 (13)	8 (23)
	Pre-emptive transplants	16 (5)	2 (3)	1 (3)
	Prevalent dialysis	1098 (322)	853 (1232)	644 (1870)
	Prevalent transplants	1330 (391)	149 (215)	94 (273)
	Total prevalence	2428 (713)	1002 (1447)	738 (2143)
	Deaths	202 (59)	118 (170)	67 (195)
2014	**New patients**	261 (76)	161 (229)	135 (383)
	New transplants	100 (29)	22 (31)	16 (45)
	Pre-emptive transplants	20 (6)	0 (0)	1 (3)
	Prevalent dialysis	1116 (323)	881 (1256)	688 (1950)
	Prevalent transplants	1361 (394)	160 (228)	105 (298)
	Total prevalence	2477 (717)	1041 (1484)	793 (2248)
	Deaths	220 (64)	126 (180)	77 (218)
2015	**New patients**	276 (78)	173 (243)	107 (296)
	New transplants	99 (28)	28 (39)	21 (58)
	Pre-emptive transplants	22 (6)	0 (0)	2 (6)
	Prevalent dialysis	1133 (322)	868 (1219)	699 (1931)
	Prevalent transplants	1407 (400)	174 (244)	118 (326)
	Total prevalence	2540 (721)	1042 (1463)	817 (2257)
	Deaths	203 (58)	176 (247)	79 (218)
2016	**New patients**	276 (77)	171 (236)	120 (323)
	New transplants	113 (31)	25 (35)	28 (75)
	Pre-emptive transplants	20 (6)	2 (3)	1 (3)
	Prevalent dialysis	1144 (318)	895 (1237)	707 (1905)
	Prevalent transplants	1451 (403)	192 (265)	127 (342)
	Total prevalence	2595 (721)	1087 (1503)	834 (2248)
	Deaths	218 (61)	131 (181)	100 (270)
2017	**New patients**	280 (76)	186 (253)	146 (384)
	New transplants	121 (33)	23 (31)	40 (105)
	Pre-emptive transplants	21 (6)	2 (3)	3 (8)
	Prevalent dialysis	1112 (302)	912 (1242)	737 (1938)
	Prevalent transplants	1507 (410)	206 (281)	164 (431)
	Total prevalence	2619 (712)	1118 (1523)	901 (2369)
	Deaths	247 (67)	154 (210)	75 (197)

Cause of Death

The causes of death in 2017 are shown in figure 10.37 and table 10.9, categorised by country, ethnicity and modality at time of death.

193 Indigenous Australian patients who were receiving dialysis died in 2017, with cardiovascular disease followed by withdrawal from treatment as the two most common causes of death. For New Zealand Māori and Pacific People, the most common cause of death amongst those who died while receiving dialysis was cardiovascular disease.

Among non-indigenous Australian and non-Māori, non-Pacific New Zealand dialysis patients, withdrawal from dialysis was the most common cause of death.

Figure 10.37.1 - Cause of Death by Modality and Ethnicity, Australia - Deaths Occurring During 2017

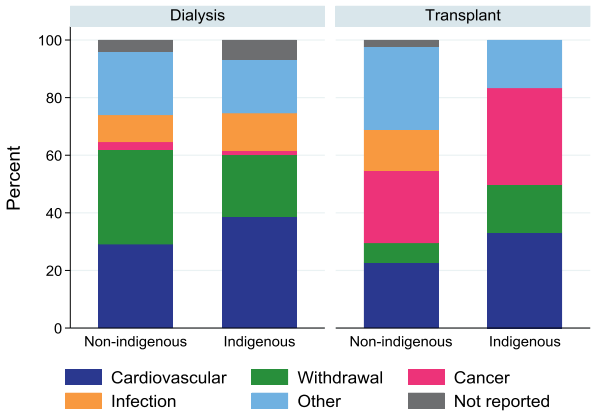


Figure 10.37.2 - Cause of Death by Modality and Ethnicity, New Zealand - Deaths Occurring During 2017

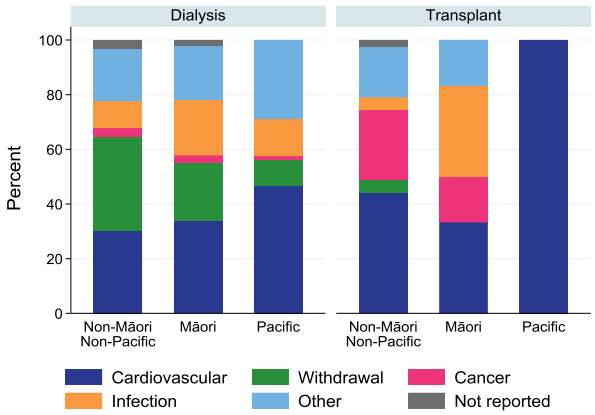


Table 10.9 Cause of Death 2017

Modality	Cause of death	Australia		New Zealand		
		Non-indigenous	Indigenous	Non-Māori, non-Pacific	Māori	Pacific People
Dialysis	**Cardiovascular**	475 (29%)	75 (39%)	61 (30%)	50 (34%)	34 (47%)
Dialysis	**Withdrawal**	538 (33%)	41 (21%)	70 (35%)	31 (21%)	7 (10%)
Dialysis	**Cancer**	42 (3%)	3 (2%)	6 (3%)	4 (3%)	1 (1%)
Dialysis	**Infection**	153 (9%)	25 (13%)	20 (10%)	30 (20%)	10 (14%)
Dialysis	**Other**	362 (22%)	36 (19%)	39 (19%)	29 (20%)	21 (29%)
Dialysis	**Not reported**	63 (4%)	13 (7%)	6 (3%)	3 (2%)	0 (0%)
Dialysis	**Total**	**1633**	**193**	**202**	**147**	**73**
Transplant	**Cardiovascular**	48 (23%)	2 (33%)	19 (44%)	2 (33%)	1 (100%)
Transplant	**Withdrawal**	14 (7%)	1 (17%)	2 (5%)	0 (0%)	0 (0%)
Transplant	**Cancer**	53 (25%)	2 (33%)	11 (26%)	1 (17%)	0 (0%)
Transplant	**Infection**	30 (14%)	0 (0%)	2 (5%)	2 (33%)	0 (0%)
Transplant	**Other**	60 (29%)	1 (17%)	8 (19%)	1 (17%)	0 (0%)
Transplant	**Not reported**	5 (2%)	0 (0%)	1 (2%)	0 (0%)	0 (0%)
Transplant	**Total**	**210**	**6**	**43**	**6**	**1**

References

[1] Australian Bureau of Statistics, 2016, Australian Statistical Geography Standard (ASGS): Volume 1 - Main Structure and Greater Capital City Statistical Areas, July 2016, cat. no. 1270.0.55.001, viewed 22 May 2018, http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1270.0.55.001July%202016?OpenDocument