



# ASSETNZ Report 2023

## New Zealand kidney transplantation and waiting list activity 2005 – 2019

21 May 2024

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# 1 Introduction

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## 1.1 BACKGROUND

Kidney transplantation is widely recognized as the optimal treatment for most individuals experiencing kidney failure, offering significant benefits in terms of both survival and quality of life, while also being more cost-effective than dialysis. However, existing healthcare systems may not serve all individuals equally, leading to disparities in access to treatment for kidney failure and varying health outcomes. Using the Access and Equity in Transplantation (ASSET) linked data platform, this report aims to investigate the dynamics and flow of the kidney transplant waitlist in New Zealand, the differences in where kidney transplant recipients live, their sex, ethnicity, and other differences in social determinants of health. Additionally, this report has the potential for generation of recommendations and practice points by identifying areas for improvements within the existing health system, with the aim of ensuring equitable access to health services for New Zealanders.

## 1.2 ANALYSIS AND METHODS

### 1.2.1 Study population

The study population in this report is defined as the population in New Zealand with kidney failure receiving dialysis, those who were ever waitlisted for kidney transplant or worked up for a living kidney transplant, and all kidney transplant recipients in New Zealand, including those who received pre-emptive transplants, between 1 Jan 2005 and 31 Dec 2019.

### 1.2.2 Data sources

**New Zealand Blood Service Database.** This database documents all individuals waitlisted for a kidney transplant, including changes in waitlist status, those assessed for living kidney transplants, and recipients of transplants, including pre-emptive transplants, from 2005 to 2019.

**National Minimum Dataset.** This dataset records health service utilization, including hospital admissions, outpatient visits, and emergency department encounters from 1988 to 2019. This information is used to determine the relevant location of residence and domiciles of transplant recipients at the time of transplantation.

**Australia and New Zealand Dialysis and Transplant Registry (ANZDATA).** ANZDATA has been collecting data since 1977 on everyone in Australia and New Zealand who receives dialysis or a transplant. This data will include everyone who received dialysis or a kidney transplant in New Zealand from 1980 to 2019.

**Australia and New Zealand Living Kidney Donation Registry (ANZLKD).** ANZLKD includes data for all living kidney donors in New Zealand from 2004 to 2019.

### 1.2.3 Updates on previous analysis

This report incorporates updated information and new analyses, building on the previous 2021 “Kidney Transplant Activity New Zealand” report. Key updates include the addition of waitlist activity dynamics, patient characteristics, such as demography and socio-economic status, transplant rates over time and analysis of kidney transplant recipient characteristics over time. These analyses enable the evaluation of equity in the kidney failure to transplant journey, and the investigation of social determinants of health and their impacts on access to transplantation.

## 1.3 ABBREVIATIONS

ANZDATA	Australia and New Zealand Dialysis and Transplant Registry
ANZKX	Australian and New Zealand Paired Kidney Exchange
DHB	District Health Board
ESKD	End-stage kidney disease
HLA	Human leukocyte antigen
NKAS	National Kidney Allocation Scheme
TSANZ	Transplantation Society of Australia and New Zealand

## 1.4 DEFINITIONS

**Early graft failure** is defined as a transplant failing within one year after transplantation.

**End-stage kidney failure (ESKD) years** are the number of years a person lives with kidney failure before transplant, death, or loss to follow-up.

**Kidney failure** for the purposes of this report only includes individuals who have begun renal replacement therapy. This definition excludes those with kidney failure who transitioned to palliative care without ever receiving dialysis or commencing transplant assessment. Additionally, patients who initiated transplant assessment but did not proceed to human leukocyte antigen (HLA) typing are also excluded from this report.

**Pre-emptive transplants** are transplants performed before a person starts dialysis.

**Pre-emptive waitlisting** is when a person is activated on the kidney transplant waiting list before starting dialysis.

**Transplant centre** in this report refers to the four kidney transplanting hospitals in New Zealand (Auckland, Starship Children’s Hospital, Wellington, and Christchurch).

**Auckland transplant centre** refers to the Auckland Renal Transplant Centre (Auckland DHB), and transplants patients referred from Northland, Waitemata, Auckland, Counties Manukau, Waikato, and Taranaki DHBs.

**Wellington transplant centre** refers to the Wellington Renal Transplant Service (Capital and Coast DHB), and transplants patients referred from Hawkes Bay, MidCentral, and Capital and Coast DHBs.

**Christchurch transplant centre** refers to the South Island Kidney Transplant Committee (Canterbury DHB), and transplants patients referred from Canterbury and Southern DHBs.

## 2 Kidney Transplant Waiting List Activity

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### 2.1 INTRODUCTION

New Zealand operates a centralized, national kidney waitlist that uses the National Kidney Allocation Scheme (NKAS) to allocate kidneys from deceased and non-directed living donors. The eligibility for being added to this waitlist is governed by the Clinical Guidelines for Organ Transplantation from Deceased Donors set by the Transplantation Society of Australia and New Zealand (TSANZ). To qualify, candidates must have a low risk of surgical complications, no active malignancies or infections, and an estimated post-transplant survival probability of over 80% at five years.

The strict eligibility criteria restrict waitlist access primarily to those without multiple morbidities, balancing the utility of organ allocation against the limited availability of organs. The NKAS employs an allocation algorithm designed to maximize the longevity of the organs and provide fair access to transplants for individuals on the waitlist. This algorithm is reviewed annually and adjusted periodically to improve equity in access to transplantation.

The transplant process includes several steps: referral for eligibility assessment, pre-waitlist testing, active waitlisting, remaining healthy on the waitlist, organ allocation from a matched donor, undergoing transplant surgery, and postoperative care to preserve graft function. Throughout this journey, some individuals may start the assessment process but not reach the active waitlist, possibly due to the availability of a living donor. Others may become inactive on the waitlist temporarily or permanently or even die before receiving a transplant. Extended periods of inactivity or frequent status changes can lead to missed transplantation opportunities and prolonged dialysis, which increases the risk of clinical worsening and death. Additionally, graft failure post-transplantation may necessitate re-entering the assessment and waitlist process.

### 2.2 OVERVIEW OF WAITING LIST ACTIVITY

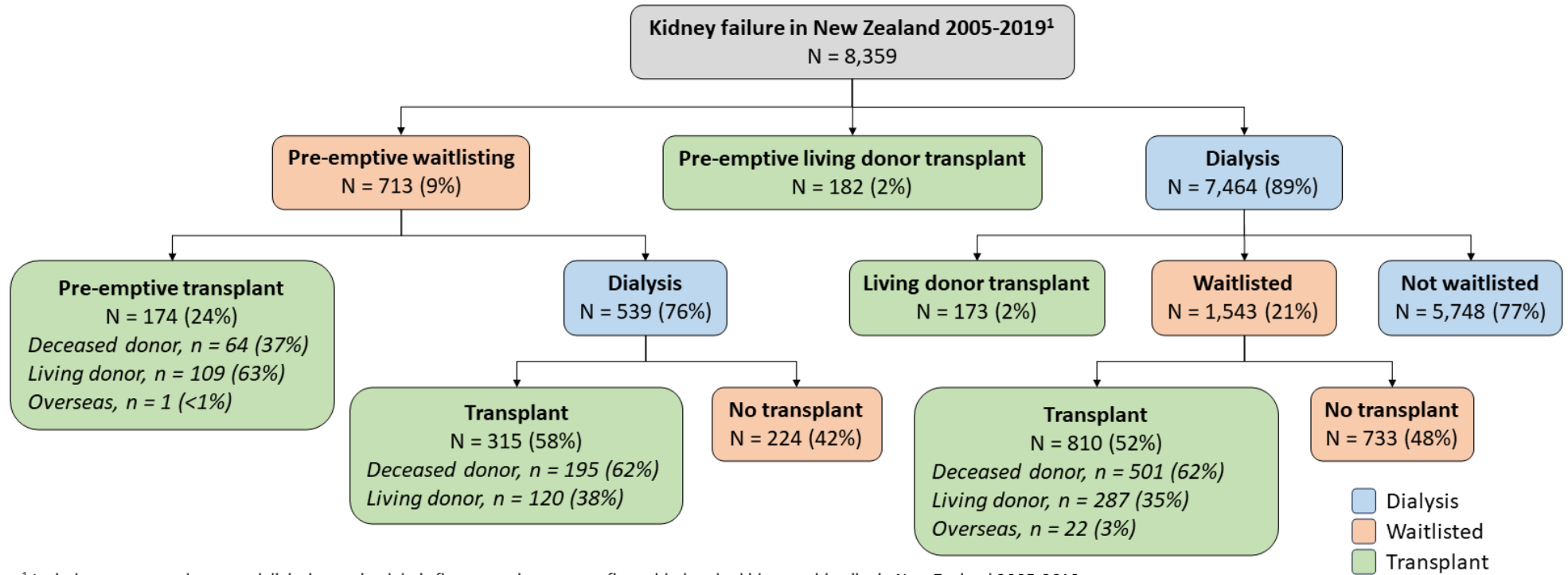
Figure 2.1 shows incident kidney failure patients in New Zealand 2005-2019, and their pathway to first transplant. From 1 Jan 2005 to 31 Dec 2019, there were 8,359 individuals with kidney failure in New Zealand. Among these individuals, 7,464 (89%) initially underwent dialysis (prior to receiving a transplant or being waitlisted). For those who did not initially undergo dialysis, 713 (9%) were pre-emptively activated on the waitlist, and 182 (2%) received a pre-emptive living donor transplant. Most people undergo dialysis before receiving a transplant. Indeed, 8,003 (96%) people have ever had dialysis before their first transplant or being waitlisted.

Of the cohort who started dialysis as the first step, 5,748 (77%) were never added to the waitlist during the study period. Conversely, 1,543 (21%) individuals were ever activated on the waitlist, and 173 (2%) received a living donor transplant. Within the group waitlisted after starting dialysis, 810 (52%) individuals ever received a transplant while the remaining 733 (48%) did not receive a transplant during the study period.

For individuals who were initially pre-emptively waitlisted, 539 (76%) underwent dialysis and 174 (24%) received a pre-emptive transplant. Out of those who underwent dialysis, 315 (58%) ever received a transplant and 224 (42%) did not receive a transplant during the study period.



Figure 2.1: Flowchart of incident kidney failure patients and their pathway to first transplant in New Zealand 2005 - 2019



<sup>1</sup> Includes everyone who started dialysis, received their first transplant, or was first added to the kidney waiting list in New Zealand 2005-2019

## 2.3 OVERALL WAITING LIST ACTIVITY

The waiting list activity for New Zealand from 2005 to 2019 is shown in Table 2.1. The New Zealand Blood Service waiting list records begin on 1 Jan 2005, hence the number of people who were waitlisted at the beginning of 2005 is shown as 0. The size of the active waiting list has remained relatively stable over time, with 307 people active at the start of 2006 and 302 active at the end of 2019. The number of people receiving a kidney transplant in each year increased from 76 in 2005 to 176 in 2019.

Figure 2.2 provides a visual representation of the movement of people in and out of the waiting list. Despite the size of the waiting list remaining relatively stable over time, the amount of movement on and off the list has increased markedly. The increase in people activated on the list has been matched by an increase in transplants, suspensions, and permanent removals. Reasons for removal from the waiting list are not recorded by the New Zealand Blood Service. In this report ‘permanently removed’ includes people who were removed and not re-activated again in the same calendar year, while suspended includes people who were removed but were re-activated again in the same calendar year.

While there were more people being made active on the waiting list over time, there were also more transplants received and more removals from the waiting list. Therefore, the overall net effect is a small increase in the number of people waitlisted at the end of the year.

**Figure 2.2: New Zealand kidney waiting list activity 2006 to 2019**

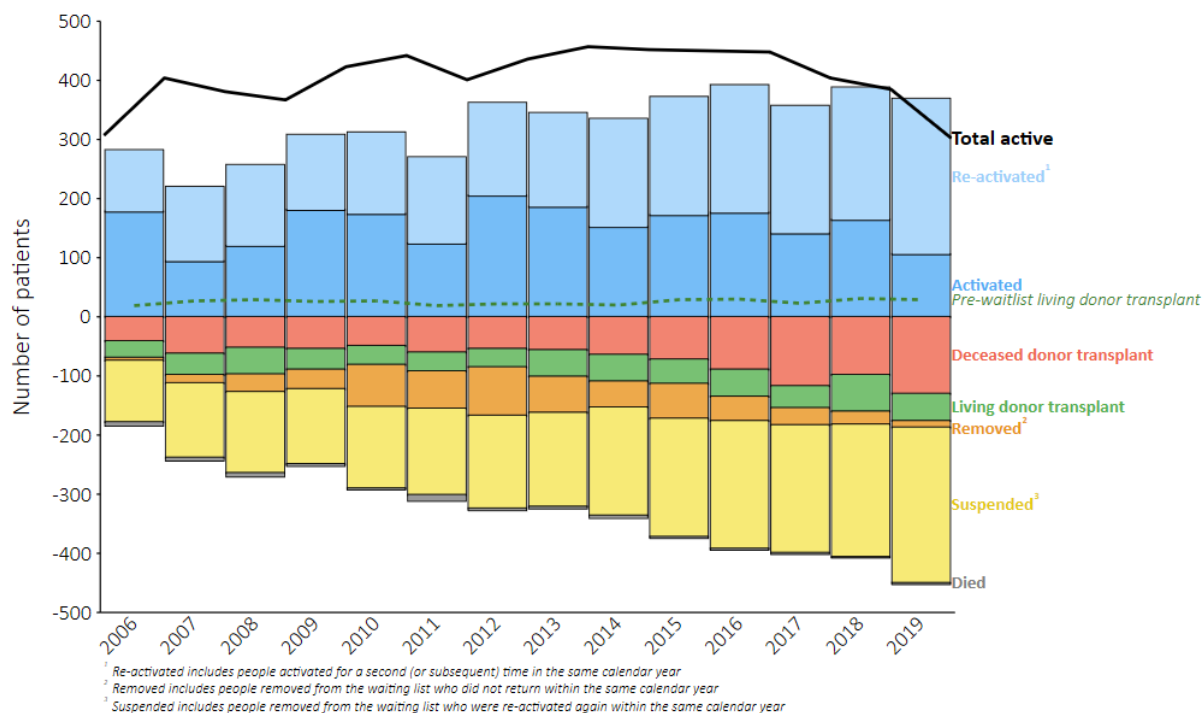


Table 2.1: New Zealand kidney waiting list activity 2005 – 2019

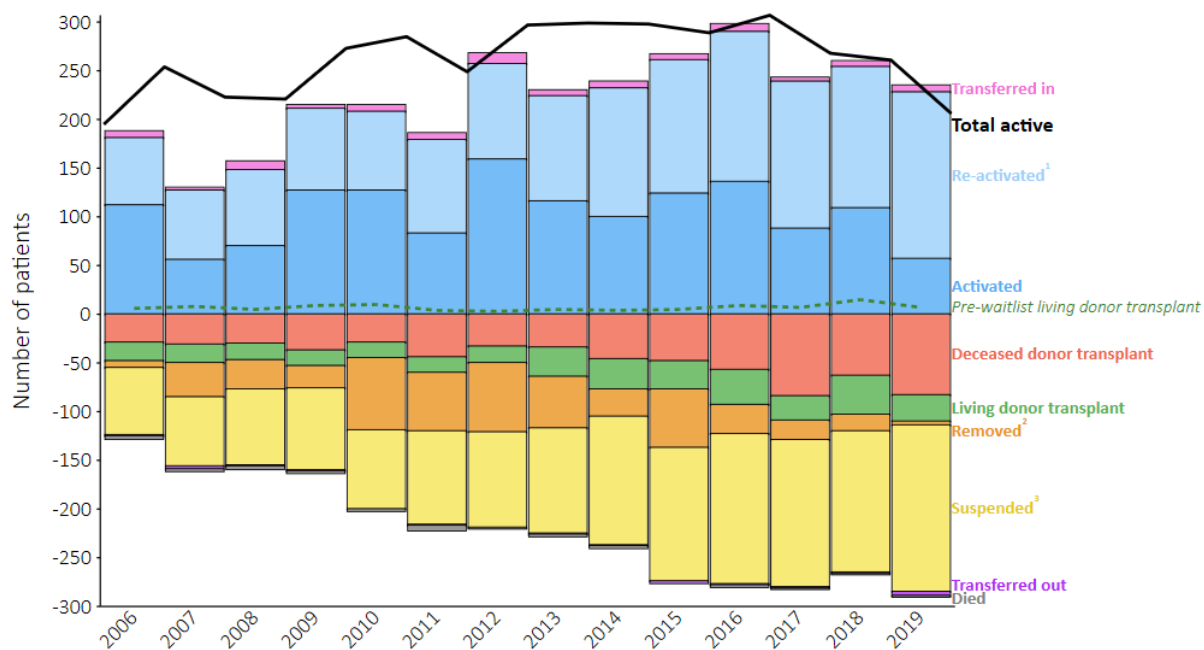
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Active at start of year (1st January)</b>	<b>0</b>	<b>307</b>	<b>404</b>	<b>381</b>	<b>367</b>	<b>423</b>	<b>442</b>	<b>401</b>	<b>436</b>	<b>457</b>	<b>452</b>	<b>450</b>	<b>448</b>	<b>404</b>	<b>385</b>
<b>Made active</b>	<b>499</b>	<b>282</b>	<b>220</b>	<b>257</b>	<b>308</b>	<b>312</b>	<b>270</b>	<b>362</b>	<b>345</b>	<b>335</b>	<b>372</b>	<b>392</b>	<b>357</b>	<b>388</b>	<b>369</b>
Pre-emptive	43	52	36	48	54	48	40	70	60	53	70	78	85	70	44
Post-dialysis	456	230	184	209	254	264	230	292	285	282	302	314	272	318	325
<b>Received kidney transplant</b>	<b>76</b>	<b>70</b>	<b>98</b>	<b>98</b>	<b>89</b>	<b>82</b>	<b>92</b>	<b>85</b>	<b>101</b>	<b>109</b>	<b>113</b>	<b>135</b>	<b>154</b>	<b>160</b>	<b>176</b>
Deceased donor	45	41	62	52	54	49	60	54	56	64	72	89	117	98	130
<i>Pre-emptive</i>	2	4	3	4	6	1	3	3	4	1	5	8	7	7	4
<i>Post-dialysis</i>	43	37	59	48	48	48	57	51	52	63	67	81	110	91	126
Living donor*	31	28	36	45	35	32	32	31	45	45	41	46	37	62	46
Overseas	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0
<b>Removed from list</b>	<b>108</b>	<b>109</b>	<b>140</b>	<b>167</b>	<b>160</b>	<b>209</b>	<b>209</b>	<b>239</b>	<b>220</b>	<b>227</b>	<b>259</b>	<b>257</b>	<b>245</b>	<b>246</b>	<b>274</b>
Permanently removed	86	80	117	133	125	154	165	170	165	157	174	178	185	183	189
Temporary suspension	22	29	23	34	35	55	44	69	55	70	85	79	60	63	85
<b>Died on list</b>	<b>8</b>	<b>6</b>	<b>5</b>	<b>6</b>	<b>3</b>	<b>2</b>	<b>10</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>
<b>Active at end of year (31st December)</b>	<b>307</b>	<b>404</b>	<b>381</b>	<b>367</b>	<b>423</b>	<b>442</b>	<b>401</b>	<b>436</b>	<b>457</b>	<b>452</b>	<b>450</b>	<b>448</b>	<b>404</b>	<b>385</b>	<b>302</b>

## 2.4 WAITING LIST ACTIVITY BY TRANSPLANT CENTRE

### 2.4.1 Auckland kidney waiting list activity 2005 - 2019

As the largest transplant unit in New Zealand, Auckland Hospital had the largest number of people active on the waiting list, driving the overall increase in total number of people on the waiting list in the country during the study period. For the new additions to the waiting list each year, pre-emptive activations on the waitlist remained a smaller proportion compared to the post-dialysis activations. Additionally, there were more transfers in from other transplanting centres around New Zealand compared to those who were transferred out, reflecting Auckland as the largest transplant centre in the country. There was also an upward trend of the number of people receiving transplants during the study period: 37 people received a kidney transplant in 2005 and this gradually increased to 110 in 2019. Like the overall trend, deceased donors represented a greater proportion of kidney transplant type compared to living donors. Waiting list activity for Auckland transplant centre is summarised in Figure 2.3 and Table 2.2.

**Figure 2.3: Auckland kidney waiting list activity 2006 to 2019**



<sup>1</sup> Re-activated includes people activated for a second (or subsequent) time in the same calendar year.  
<sup>2</sup> Removed includes people removed from the waiting list who did not return within the same calendar year.  
<sup>3</sup> Suspended includes people removed from the waiting list who were re-activated again within the same calendar year.

Table 2.2: Auckland kidney waiting list activity 2005 to 2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Active at start of year (1st January)</b>	<b>0</b>	<b>195</b>	<b>254</b>	<b>223</b>	<b>221</b>	<b>273</b>	<b>285</b>	<b>249</b>	<b>297</b>	<b>299</b>	<b>298</b>	<b>289</b>	<b>307</b>	<b>268</b>	<b>261</b>
<b>Made active</b>	<b>312</b>	<b>181</b>	<b>127</b>	<b>148</b>	<b>211</b>	<b>208</b>	<b>179</b>	<b>257</b>	<b>224</b>	<b>232</b>	<b>261</b>	<b>290</b>	<b>239</b>	<b>254</b>	<b>228</b>
Pre-emptive	32	44	21	29	39	25	30	47	32	32	47	57	55	42	26
Post-dialysis	280	137	106	119	172	183	149	210	192	200	214	233	184	212	202
<b>Transfers in</b>	<b>1</b>	<b>7</b>	<b>3</b>	<b>9</b>	<b>4</b>	<b>7</b>	<b>7</b>	<b>11</b>	<b>6</b>	<b>7</b>	<b>6</b>	<b>8</b>	<b>4</b>	<b>6</b>	<b>7</b>
from Wellington	1	3	2	4	1	3	0	4	1	2	3	3	4	3	3
from Christchurch	0	0	0	3	0	1	3	3	1	2	1	3	0	1	1
from Starship	0	4	1	2	3	3	4	4	4	3	2	2	0	2	3
<b>Received kidney transplant</b>	<b>37</b>	<b>49</b>	<b>50</b>	<b>47</b>	<b>53</b>	<b>46</b>	<b>60</b>	<b>50</b>	<b>64</b>	<b>77</b>	<b>77</b>	<b>93</b>	<b>109</b>	<b>103</b>	<b>110</b>
Deceased donor	22	29	31	30	37	29	44	33	34	46	48	57	84	63	83
<i>Pre-emptive</i>	2	4	2	3	3	1	3	3	3	0	4	6	5	2	1
<i>Post-dialysis</i>	20	25	29	27	34	28	41	30	31	46	44	51	79	61	82
Living donor*	15	19	19	17	16	16	16	17	30	31	29	36	25	40	27
Overseas	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
<b>Removed from list</b>	<b>74</b>	<b>76</b>	<b>106</b>	<b>108</b>	<b>107</b>	<b>155</b>	<b>156</b>	<b>169</b>	<b>161</b>	<b>160</b>	<b>197</b>	<b>184</b>	<b>171</b>	<b>162</b>	<b>175</b>
Permanently removed	59	59	90	81	79	121	126	122	120	108	139	126	131	122	119
Temporary suspension	15	17	16	27	28	34	30	47	41	52	58	58	40	40	56
<b>Transferred out</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>4</b>
to Wellington	3	0	2	1	0	0	0	0	0	1	1	1	1	0	1
to Christchurch	0	1	1	0	1	0	1	0	0	0	1	0	0	0	0
to Starship	0	0	0	0	0	0	0	0	1	0	0	0	0	1	3
<b>Died on list</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>
<b>Active at end of year (31st December)</b>	<b>195</b>	<b>254</b>	<b>223</b>	<b>221</b>	<b>273</b>	<b>285</b>	<b>249</b>	<b>297</b>	<b>299</b>	<b>298</b>	<b>289</b>	<b>307</b>	<b>268</b>	<b>261</b>	<b>206</b>

## 2.4.2 Wellington kidney waiting list activity 2005 - 2019

Wellington hospital showed an increase in the number of people active on the waitlist at the start of the year at the beginning of the study period, peaking in 2012 with 101 people, and then decreased from then on to 65 in 2019. The number of people made active during the year fluctuated from year to year, but the number of people made active post-dialysis remained a much larger proportion compared to pre-emptive activations on the waitlist throughout the period. The number of people transferred out to other transplanting centres remained low below 5 individuals a year and was slightly more than those transferred into Wellington each year. Those receiving a kidney transplant at Wellington Hospital remained relatively constant, varying from 22 people in 2005 to 34 in 2019, with the majority receiving a kidney from a deceased donor. Waiting list activity for Wellington transplant centre is summarised in Figure 2.4 and Table 2.3.

Figure 2.4: Wellington kidney waiting list activity 2006 to 2019

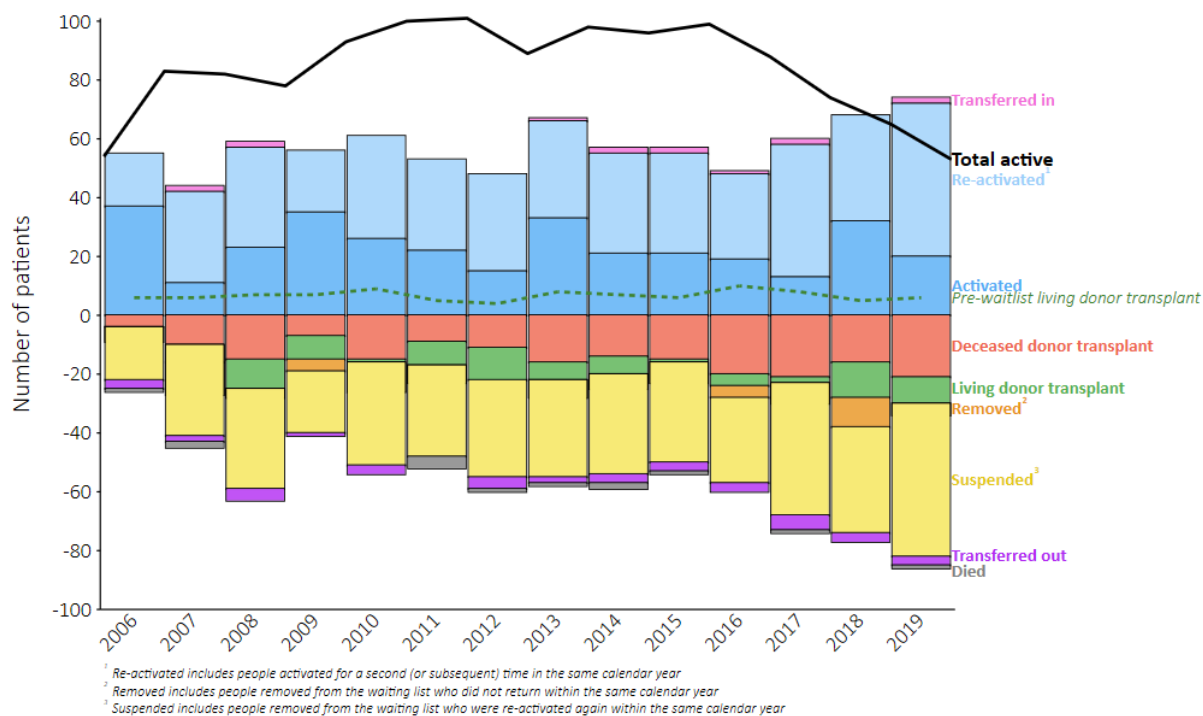


Table 2.3: Wellington kidney waiting list activity 2005 to 2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Active at start of year (1st January)</b>	<b>0</b>	<b>54</b>	<b>83</b>	<b>82</b>	<b>78</b>	<b>93</b>	<b>100</b>	<b>101</b>	<b>89</b>	<b>98</b>	<b>96</b>	<b>99</b>	<b>88</b>	<b>74</b>	<b>65</b>
<b>Made active</b>	<b>88</b>	<b>55</b>	<b>42</b>	<b>57</b>	<b>56</b>	<b>61</b>	<b>53</b>	<b>48</b>	<b>66</b>	<b>55</b>	<b>55</b>	<b>48</b>	<b>58</b>	<b>68</b>	<b>72</b>
Pre-emptive	4	4	6	12	9	11	6	9	16	11	14	10	11	12	8
Post-dialysis	84	51	36	45	47	50	47	39	50	44	41	38	47	56	64
<b>Transfers in</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>2</b>
from Auckland	3	0	2	1	0	0	0	0	0	1	1	1	1	0	1
from Christchurch	0	0	0	0	0	0	0	0	1	1	1	0	1	0	1
from Starship	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
<b>Received kidney transplant</b>	<b>22</b>	<b>9</b>	<b>27</b>	<b>28</b>	<b>15</b>	<b>26</b>	<b>23</b>	<b>22</b>	<b>28</b>	<b>25</b>	<b>23</b>	<b>24</b>	<b>30</b>	<b>28</b>	<b>34</b>
Deceased donor	13	4	16	15	7	15	9	11	16	14	15	20	21	16	21
<i>Pre-emptive</i>	0	0	1	1	1	0	0	0	1	0	1	2	0	2	3
<i>Post-dialysis</i>	13	4	15	14	6	15	9	11	15	14	14	18	21	14	18
Living donor*	9	5	11	13	8	11	14	11	12	11	8	4	9	12	13
Overseas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Removed from list</b>	<b>10</b>	<b>13</b>	<b>14</b>	<b>31</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>33</b>	<b>27</b>	<b>29</b>	<b>27</b>	<b>33</b>	<b>38</b>	<b>46</b>	<b>48</b>
Permanently removed	9	8	14	29	20	19	21	27	25	25	20	31	29	41	34
Temporary suspension	1	5	0	2	5	6	4	6	2	4	7	2	9	5	14
<b>Transferred out</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>4</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>3</b>
to Auckland	1	3	2	4	1	3	0	4	1	2	3	3	4	3	3
to Christchurch	1	0	0	0	0	0	0	0	1	1	0	0	1	0	0
to Starship	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Died on list</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>
<b>Active at end of year (31st December)</b>	<b>54</b>	<b>83</b>	<b>82</b>	<b>78</b>	<b>93</b>	<b>100</b>	<b>101</b>	<b>89</b>	<b>98</b>	<b>96</b>	<b>99</b>	<b>88</b>	<b>74</b>	<b>65</b>	<b>53</b>

### 2.4.3 Christchurch kidney waiting list activity 2005 - 2019

The waiting list activity dynamics of Christchurch hospital is shown in Table 2.4. The number of people active at the start of the year remained relatively constant, ranging from a low of 44 in 2012 and a high of 69 in 2008. As with the other transplant centres, the number of activations on the waiting list post-dialysis was much higher than the pre-emptive activations. There was some variability in the number of transplants performed each year, varying from a low of 6 in 2014 to a peak of 29 in 2019., while removals from the waiting list remained relatively constant throughout the period. Waiting list activity for Christchurch transplant centre is summarised in Figure 2.5 and Table 2.4.

**Figure 2.5: Christchurch kidney waiting list activity 2005 to 2019**

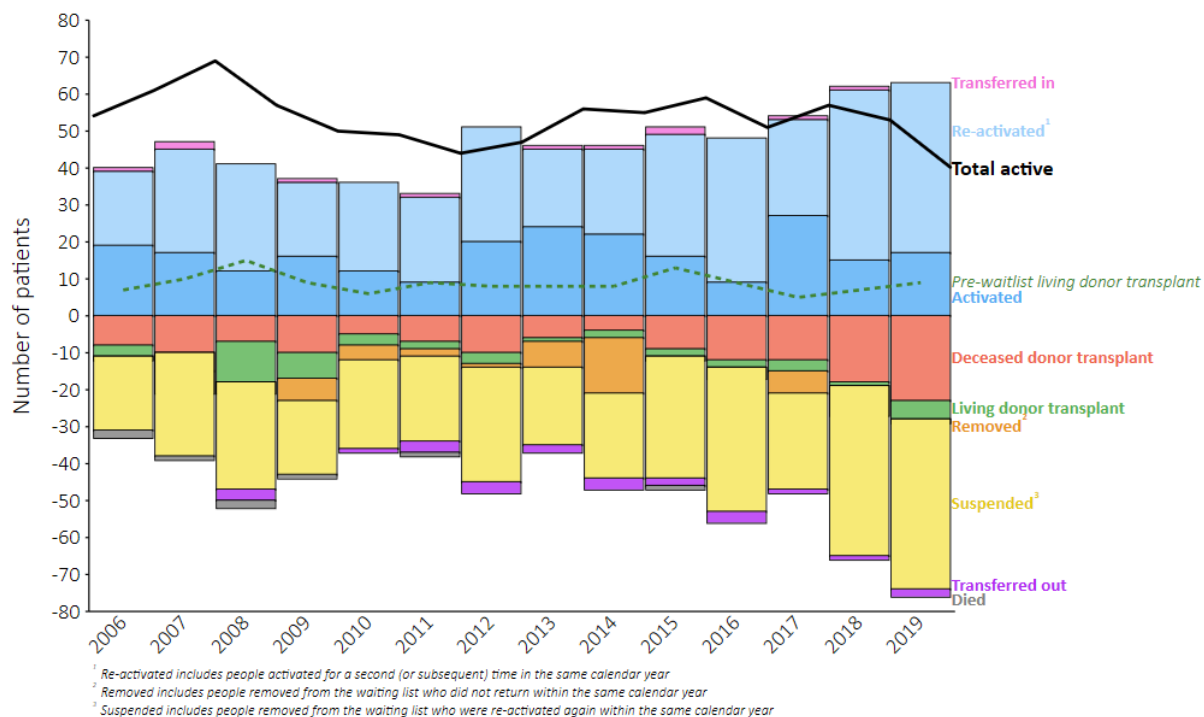




Table 2.4: Christchurch kidney waiting list activity 2005 to 2019

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Active at start of year (1st January)</b>	<b>0</b>	<b>54</b>	<b>61</b>	<b>69</b>	<b>57</b>	<b>50</b>	<b>49</b>	<b>44</b>	<b>47</b>	<b>56</b>	<b>55</b>	<b>59</b>	<b>51</b>	<b>57</b>	<b>53</b>
<b>Made active</b>	<b>94</b>	<b>39</b>	<b>45</b>	<b>41</b>	<b>36</b>	<b>36</b>	<b>32</b>	<b>51</b>	<b>45</b>	<b>45</b>	<b>49</b>	<b>48</b>	<b>53</b>	<b>61</b>	<b>63</b>
Pre-emptive	7	3	7	6	6	11	4	14	11	9	9	10	17	16	10
Post-dialysis	87	36	38	35	30	25	28	37	34	36	40	38	36	45	53
<b>Transfers in</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>
from Auckland	0	1	1	0	1	0	1	0	0	0	1	0	0	0	0
from Wellington	1	0	0	0	0	0	0	0	1	1	0	0	1	0	0
from Starship	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0
<b>Received kidney transplant</b>	<b>17</b>	<b>12</b>	<b>21</b>	<b>22</b>	<b>17</b>	<b>8</b>	<b>9</b>	<b>13</b>	<b>7</b>	<b>6</b>	<b>12</b>	<b>17</b>	<b>15</b>	<b>27</b>	<b>29</b>
Deceased donor	10	8	15	7	10	5	7	10	6	4	9	12	12	18	23
<i>Pre-emptive</i>	0	0	0	0	2	0	0	0	0	1	0	0	2	3	0
<i>Post-dialysis</i>	10	8	15	7	8	5	7	10	6	3	9	12	10	15	23
Living donor*	7	4	6	14	7	3	2	3	1	2	3	5	3	9	6
Overseas	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
<b>Removed from list</b>	<b>23</b>	<b>19</b>	<b>17</b>	<b>26</b>	<b>26</b>	<b>28</b>	<b>25</b>	<b>32</b>	<b>28</b>	<b>38</b>	<b>32</b>	<b>36</b>	<b>32</b>	<b>38</b>	<b>45</b>
Permanently removed	17	13	11	23	24	13	15	17	16	24	14	17	22	20	30
Temporary suspension	6	6	6	3	2	15	10	15	12	14	18	19	10	18	15
<b>Transferred out</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>2</b>
to Auckland	0	0	0	3	0	1	3	3	1	2	1	3	0	1	1
to Wellington	0	0	0	0	0	0	0	0	1	1	1	0	1	0	1
to Starship	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Died on list</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Active at end of year (31st December)</b>	<b>54</b>	<b>61</b>	<b>69</b>	<b>57</b>	<b>50</b>	<b>49</b>	<b>44</b>	<b>47</b>	<b>56</b>	<b>55</b>	<b>59</b>	<b>51</b>	<b>57</b>	<b>53</b>	<b>40</b>

## 2.4.4 Starship Children’s Hospital kidney waiting list activity 2005 - 2019

Starship Hospital is a public children’s hospital in Auckland, and the largest purpose-built children’s hospital in New Zealand. Waiting list activity is much lower than the other centres because kidney failure is rare in children. Waiting list activity for Starship Children’s Hospital is summarised in Table 2.5.

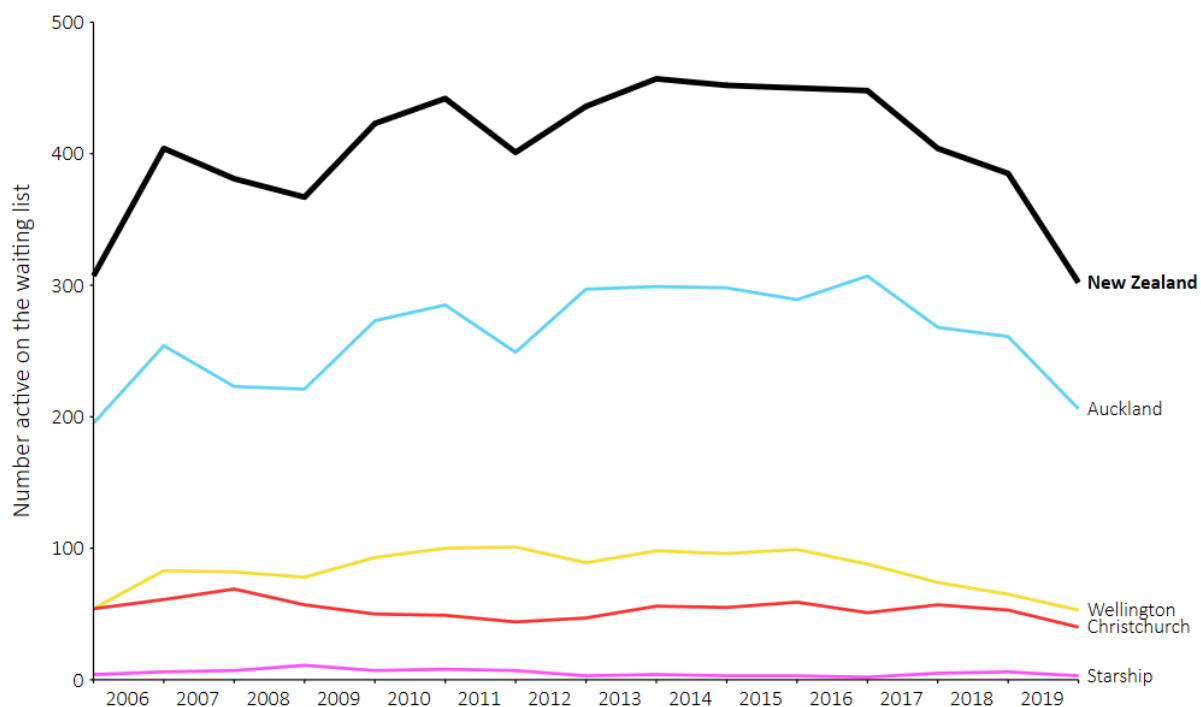
**Table 2.5: Starship Children’s Hospital kidney waiting list activity 2005 to 2019**

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Active at start of year (1st January)</b>	<b>0</b>	<b>4</b>	<b>6</b>	<b>7</b>	<b>11</b>	<b>7</b>	<b>8</b>	<b>7</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>5</b>	<b>6</b>
<b>Made active</b>	<b>5</b>	<b>7</b>	<b>6</b>	<b>11</b>	<b>5</b>	<b>7</b>	<b>6</b>	<b>6</b>	<b>10</b>	<b>3</b>	<b>7</b>	<b>6</b>	<b>7</b>	<b>5</b>	<b>6</b>
Pre-emptive	0	1	2	1	0	1	0	0	1	1	0	1	2	0	0
Post-dialysis	5	6	4	10	5	6	6	6	9	2	7	5	5	5	6
<b>Transfers in</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>3</b>
from Auckland	0	0	0	0	0	0	0	0	1	0	0	0	0	1	3
from Wellington	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
from Christchurch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Received kidney transplant</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>3</b>
Deceased donor	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
<i>Pre-emptive</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Post-dialysis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
Living donor*	0	0	0	1	4	2	0	0	2	1	1	1	0	1	0
Overseas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Removed from list</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>4</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>6</b>
Permanently removed	1	0	2	0	2	1	3	4	4	0	1	4	3	0	6
Temporary suspension	0	1	1	2	0	0	0	1	0	0	2	0	1	0	0
<b>Transferred out</b>	<b>0</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>3</b>
to Auckland	0	4	1	2	3	3	4	4	4	3	2	2	0	2	3
to Wellington	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
to Christchurch	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0
<b>Died on list</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Active at end of year (31st December)</b>	<b>4</b>	<b>6</b>	<b>7</b>	<b>11</b>	<b>7</b>	<b>8</b>	<b>7</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>5</b>	<b>6</b>	<b>3</b>

### 2.4.5 Active waiting list over time by transplant centre

Figure 2.6 shows the number of people who were active on the waiting list at the end of each year, by transplant centre. The total size of the waiting list has remained relatively stable within each transplant centre, with 302 people actively waiting for a kidney transplant at the end of 2019. The majority are waitlisted at Auckland (206, 68%), with 53 (17%) at Wellington, 40 (13%) at Christchurch, and 3 (<1%) at Starship Children’s Hospital.

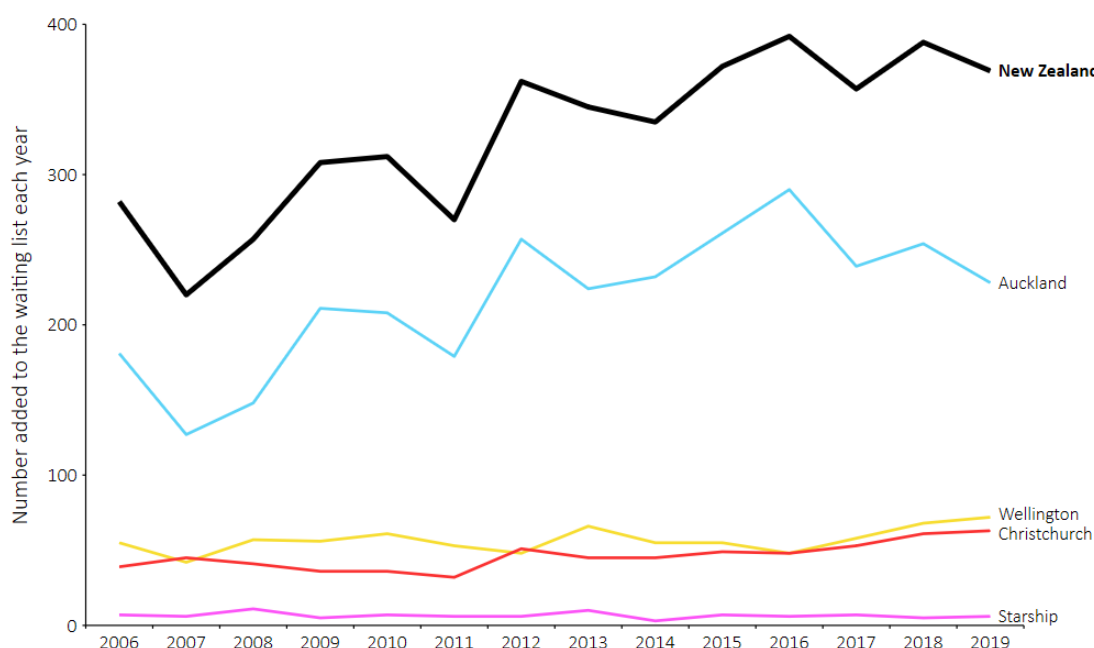
**Figure 2.6: Number of people active on the waiting list from 2006 to 2019 for each transplant centre**



### 2.4.6 People activated on the waiting list by transplant centre

Figure 2.7 shows the number of people who were added to the waiting list during each year, by transplant centre. There is an increase in the overall number of people added to the waiting list in New Zealand, largely driven by Auckland, and with Wellington and Christchurch also showing increases over time.

**Figure 2.7: Number of people added to the waiting list from 2006 to 2019 for each transplant centre**



### 2.4.7 Waiting list activity by District Health Board

**Auckland transplantation centre comprises the Northland, Waitemata, Auckland, Counties Manukau, Waikato, and Taranaki transplantation unit. Both Auckland and Counties Manukau units comprise the majority of people on the waiting list per year for the Auckland transplantation centre. For the Wellington transplantation centre, Capital and Coast transplant unit had more people on the waiting list compared to Hawkes Bay and MidCentral. Finally, Christchurch transplantation centre had fewer people on the waiting list compared to Auckland and Wellington, and this was made up of the Canterbury and Southern transplant units, with the Canterbury transplant unit consistently more people on the waiting list each year.**

Table 2.6 provides details of the number of people active on the waiting list by DHB.

Table 2.6: Number active on the waiting list at the start of each year by District Health Board (DHB)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Total</b>	<b>307</b>	<b>404</b>	<b>381</b>	<b>367</b>	<b>423</b>	<b>442</b>	<b>401</b>	<b>436</b>	<b>457</b>	<b>452</b>	<b>450</b>	<b>448</b>	<b>404</b>	<b>385</b>
<b>Starship</b>	<b>4</b>	<b>6</b>	<b>7</b>	<b>11</b>	<b>7</b>	<b>8</b>	<b>7</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>5</b>	<b>6</b>
<b>Auckland</b>	<b>195</b>	<b>254</b>	<b>223</b>	<b>221</b>	<b>273</b>	<b>285</b>	<b>249</b>	<b>297</b>	<b>299</b>	<b>298</b>	<b>289</b>	<b>307</b>	<b>268</b>	<b>261</b>
Northland	29	42	36	36	23	25	24	22	33	33	23	32	26	20
Waitemata	0	0	0	2	5	12	42	56	56	52	53	58	44	45
Auckland	66	77	70	76	88	89	52	58	52	57	56	55	51	50
Counties Manukau	53	66	58	49	85	95	74	102	95	99	96	99	78	73
Waikato	37	56	47	54	67	55	50	51	54	45	49	50	58	63
Taranaki	10	13	12	4	5	9	7	8	9	12	12	13	11	10
<b>Wellington</b>	<b>54</b>	<b>83</b>	<b>82</b>	<b>78</b>	<b>93</b>	<b>100</b>	<b>101</b>	<b>89</b>	<b>98</b>	<b>96</b>	<b>99</b>	<b>88</b>	<b>74</b>	<b>65</b>
Hawkes Bay	0	0	11	16	27	21	18	21	23	27	21	13	9	11
MidCentral	10	17	15	12	10	17	19	14	23	15	17	11	8	7
Capital and Coast	44	66	56	50	56	62	64	54	52	54	61	64	57	47
<b>Christchurch</b>	<b>54</b>	<b>61</b>	<b>69</b>	<b>57</b>	<b>50</b>	<b>49</b>	<b>44</b>	<b>47</b>	<b>56</b>	<b>55</b>	<b>59</b>	<b>51</b>	<b>57</b>	<b>53</b>
Canterbury	41	46	45	42	33	34	31	32	36	38	39	35	39	36
Southern	13	15	24	15	17	15	13	15	20	17	20	16	18	17

## 2.5 CHARACTERISTICS OF PEOPLE ACTIVE ON THE WAITLIST

The characteristics of people who were active on the waiting list at the end of 2005, 2010, 2015, and 2019 across New Zealand are shown in Table 2.7. The median age and sex distribution has remained fairly constant over time, however there has been an increase in Māori and Pacific Peoples active on the waitlist over time. Additionally, there has been an increase in the proportion of people with higher deprivation scores over time, suggesting increased access to the waiting list for people from lower socio-economic areas. Similarly, the proportion of people active on the waiting list appears to become more urban over the study period.

**Table 2.7: Characteristics of people active on the waiting list at the end of each 5-year period**

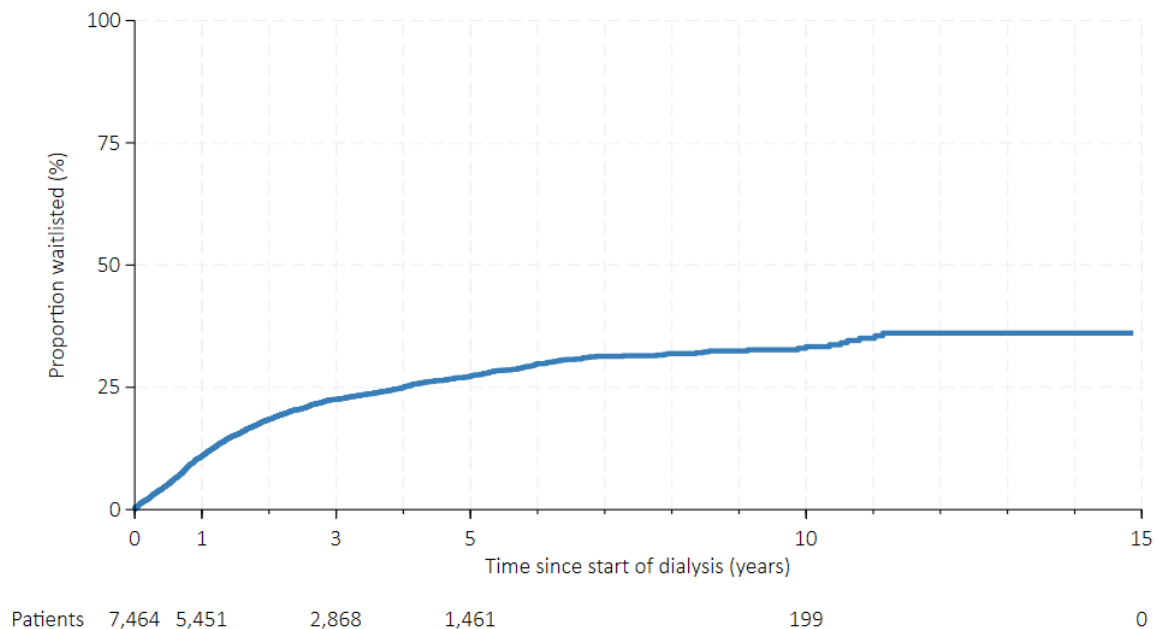
<b>Characteristic, n (%)</b>	<b>2005</b>		<b>2010</b>		<b>2015</b>		<b>2019</b>	
<b>Total</b>	307	(100)	442	(100)	450	(100)	302	(100)
<b>Age, median (IQR)</b>	48	(39,57)	53	(42,61)	51	(41,59)	50	(41,57)
0-17	1	(<1)	5	(1)	4	(<1)	7	(2)
18-44	52	(17)	87	(20)	139	(31)	128	(42)
45-54	74	(24)	91	(21)	136	(30)	110	(36)
55-64	87	(28)	133	(30)	134	(30)	50	(17)
65+	93	(30)	126	(29)	37	(8)	7	(2)
<b>Sex</b>								
Female	119	(39)	184	(42)	205	(46)	134	(44)
Male	188	(61)	258	(58)	245	(54)	168	(56)
<b>Blood Group</b>								
O	170	(55)	212	(48)	205	(46)	140	(46)
A	104	(34)	152	(34)	155	(34)	121	(40)
B	24	(8)	64	(14)	73	(16)	33	(11)
AB	9	(3)	14	(3)	17	(4)	8	(3)
<b>Ethnicity</b>								
Māori	66	(21)	75	(17)	101	(22)	75	(25)
Pacific Peoples	44	(14)	74	(17)	113	(25)	70	(23)
European	170	(55)	226	(51)	165	(37)	110	(36)
Asian	26	(8)	65	(15)	61	(14)	36	(12)
Other	1	(<1)	2	(<1)	10	(2)	11	(4)
<b>Deprivation quintile (of domicile)</b>								
1 (most deprived)	95	(31)	141	(32)	175	(39)	112	(37)
2	65	(21)	73	(17)	89	(20)	76	(25)
3	62	(20)	90	(20)	88	(20)	54	(18)
4	58	(19)	79	(18)	58	(13)	34	(11)
5 (least deprived)	26	(8)	57	(13)	37	(8)	25	(8)
Overseas resident	1	(<1)	2	(<1)	3	(<1)	1	(<1)
<b>Rurality (of domicile)</b>								
Urban 1 (most urban)	191	(62)	294	(67)	308	(68)	213	(71)
Urban 2	52	(17)	74	(17)	68	(15)	37	(12)
Rural 1	38	(12)	45	(10)	46	(10)	27	(9)
Rural 2	16	(5)	23	(5)	19	(4)	21	(7)
Rural 3 (most rural)	3	(<1)	2	(<1)	6	(1)	3	(<1)
Overseas resident	1	(<1)	2	(<1)	3	(<1)	1	(<1)
Domicile not reported	6	(2)	2	(<1)	0	(0)	0	(0)

## 2.6 JOURNEY FROM DIALYSIS TO WAITING LIST

### 2.6.1 Time from commencing dialysis to being activated on the waiting list

Figure 2.8 shows the proportion of people who were waitlisted over time after commencing dialysis. Around 10% of people are activated on the waiting list within 1 year of starting dialysis. Many people will never be activated on the waiting list, for example if they find a suitable a living donor.

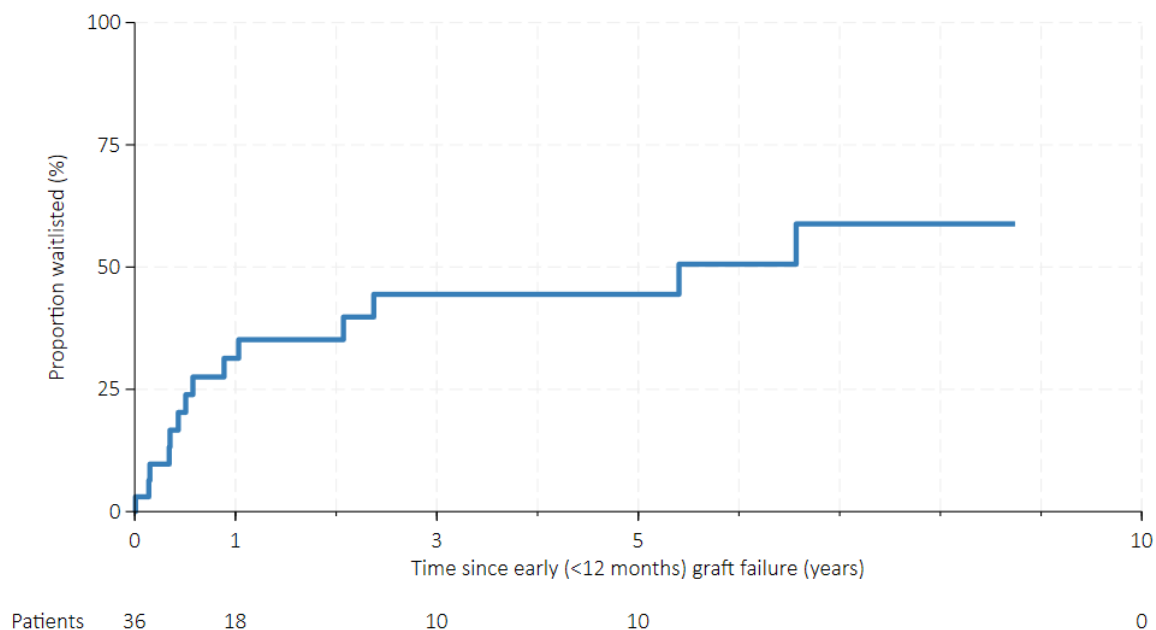
**Figure 2.8: Time from commencing dialysis to being added to the waiting list**



### 2.6.2 Time from early graft failure to re-activation on the waiting list

Figure 2.9 shows the proportion of people re-activated on the waiting list after early graft failure (defined as <1 year after transplant). Around 35% of people are re-activated on the waiting list within 1 year.

**Figure 2.9 : Proportion of people who were returned to the waiting list after an early graft failure**



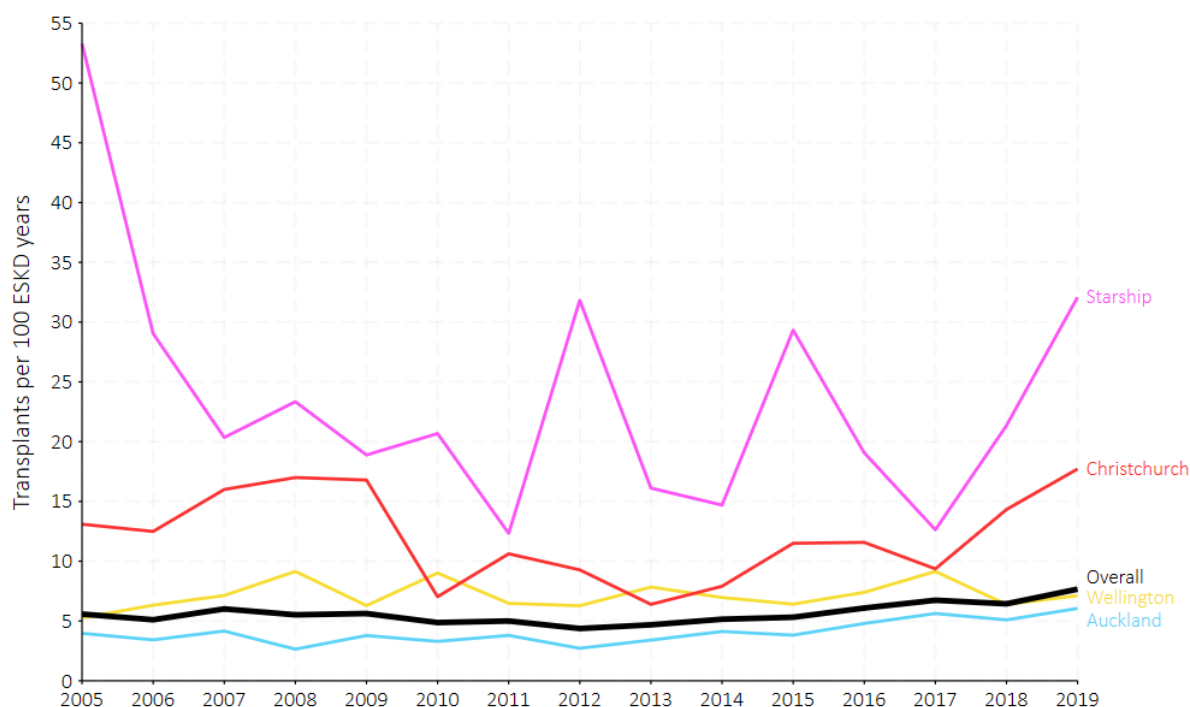
## 3 Kidney Transplants

### 3.1 TRANSPLANT RATES OVER TIME

#### 3.1.1 Transplant rates over time by transplant centre

The number of transplants performed at each transplant centre, expressed as a rate per 100 years of end-stage kidney disease (ESKD), is shown in Figure 3.1. The transplant rates for Starship are higher than the other transplant centres because Starship is a children’s hospital and kidney disease is rare in children. Additionally, Christchurch is the smallest transplant centre in the country, and so due to smaller numbers at the centre, there may be more random variability in transplantation rates from year to year.

**Figure 3.1: Transplants per 100 ESKD years by transplant centre 2005 to 2019**

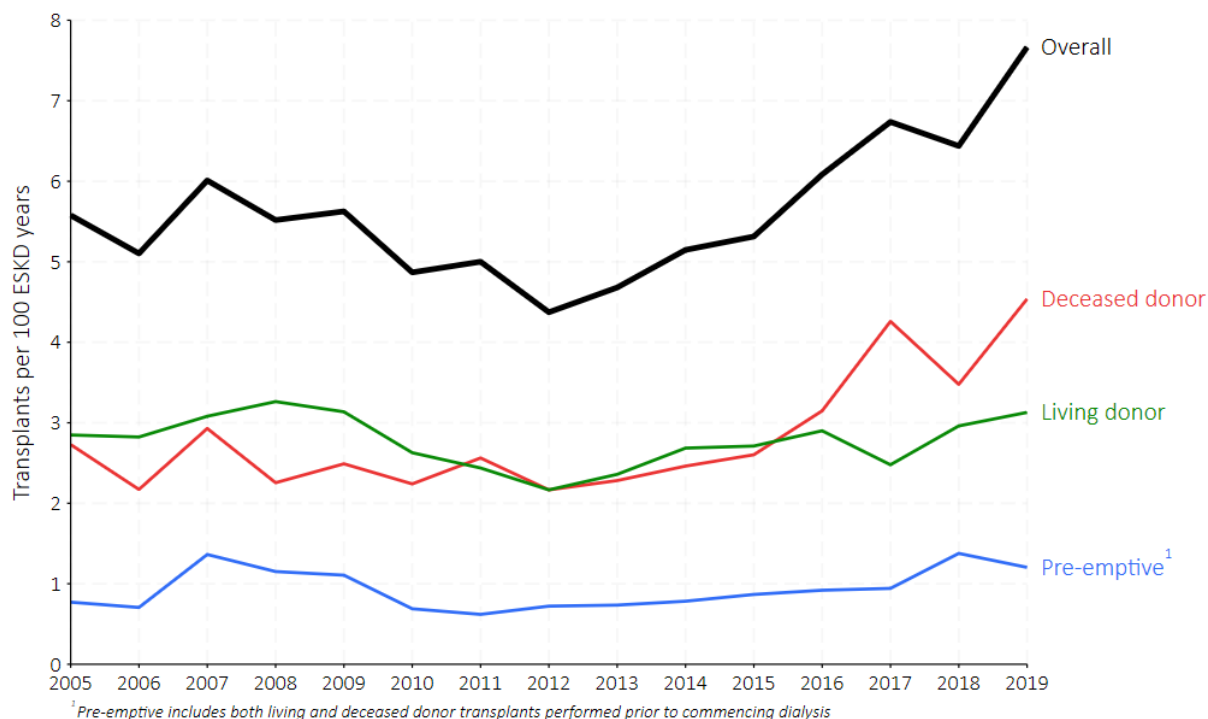


#### 3.1.2 Transplant rates over time by transplant type

There is an increase of overall transplant rates over time, which is mainly driven by an increase in deceased donors. Pre-emptive transplants remain relatively low throughout the period at around 1 transplant per 100 ESKD years. Figure 3.2 is a graph showing the transplants per 100 ESKD years by donor type over time.



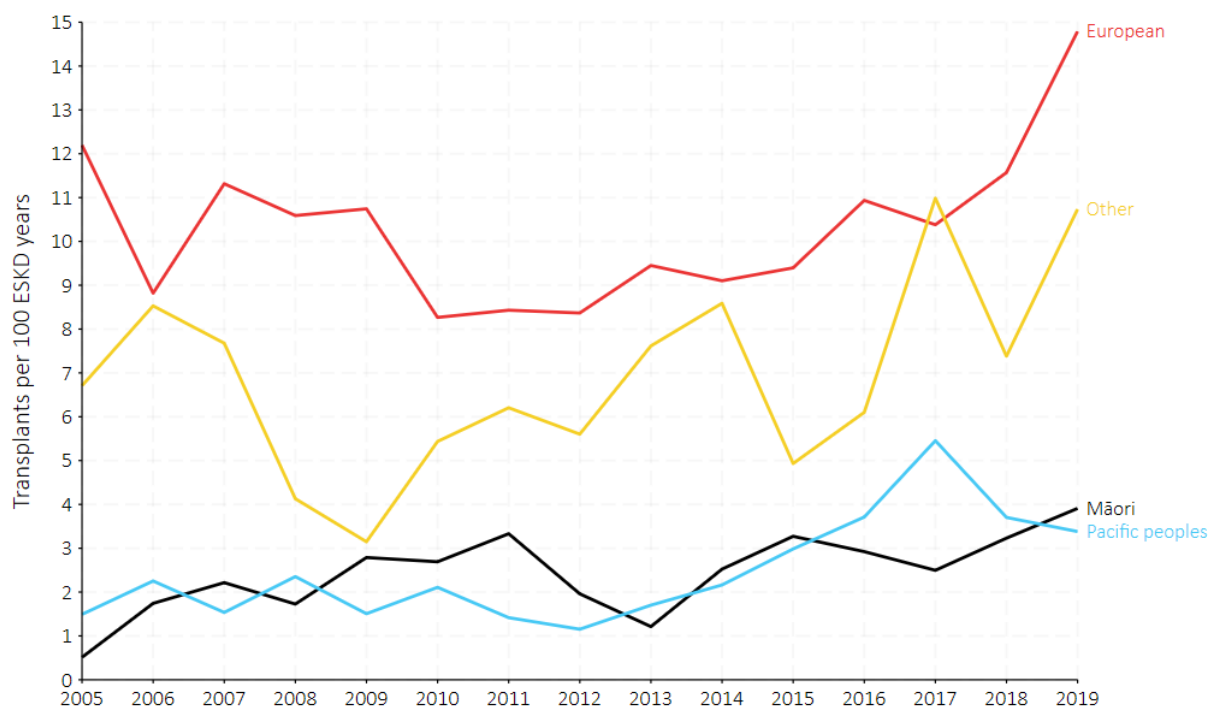
Figure 3.2: Transplants per 100 ESKD years by transplant type 2005 to 2019



### 3.1.3 Transplant rates over time by ethnicity

Figure 3.3 shows the transplant rate by ethnicity. Transplant rates of people of European ethnicity are generally higher than other ethnic groups over time. Transplant rates for Māori and Pacific Peoples are lower than other ethnic groups year on year but show slight increases towards the end of the study period.

Figure 3.3: Transplants per 100 ESKD years by ethnicity 2005 to 2019



## 3.2 CHARACTERISTICS OF TRANSPLANT RECIPIENTS

### 3.2.1 Characteristics of transplant recipients by 5-year period

Table 3.1 shows the overall characteristics of transplant recipients within each 5-year period from starting from 2005 to 2019. The median age of transplant recipients was largely similar for each period, and so are proportions of each age group, with recipients aged 18 to 44 comprising the largest proportion of all recipients. Distribution of sex and blood group for each 5-year period was also relatively similar. However, transplant recipients of European ethnicity have increased in proportion over time while the proportions of Māori and Pacific Peoples have decreased. When comparing deprivation quintiles and rurality of transplant recipients over time, there was a decrease in the proportion of people classified as the most deprived and an increase in the proportion of those classified as least deprived. Similarly, the proportion of those living in the most urban areas decreased over time, and correspondingly the proportion of those living in less urban areas increased over the same period.

**Table 3.1: Characteristics of New Zealand kidney transplant recipients by 5-year period**

Characteristic, n (%)	2005 - 2009	2010 - 2014	2015 - 2019
<b>Total</b>	548 (100)	590 (100)	909 (100)
<b>Age, median (IQR)</b>	47 (35, 56)	50 (37, 59)	50 (38, 59)
0-17	33 (6)	28 (5)	38 (4)
18-44	205 (37)	188 (32)	289 (32)
45-54	132 (24)	149 (25)	242 (27)
55-64	133 (24)	167 (28)	262 (29)
65+	45 (8)	58 (10)	78 (9)
<b>Sex</b>			
Female	221 (40)	199 (34)	353 (39)
Male	327 (60)	391 (66)	556 (61)
<b>Blood Group</b>			
O	257 (47)	252 (43)	419 (46)
A	218 (40)	254 (43)	330 (36)
B	49 (9)	62 (11)	118 (13)
AB	21 (4)	20 (3)	41 (5)
<b>Ethnicity</b>			
Māori	62 (11)	87 (15)	141 (16)
Pacific Peoples	34 (6)	49 (8)	149 (16)
European	416 (76)	385 (65)	482 (53)
Asian	32 (6)	62 (11)	108 (12)
Other	4 (<1)	7 (1)	23 (3)
<b>Deprivation quintile (of domicile)</b>			
1 (most deprived)	113 (21)	136 (23)	250 (28)
2	128 (23)	125 (21)	194 (21)
3	103 (19)	112 (19)	170 (19)
4	102 (19)	114 (19)	167 (18)
5 (least deprived)	101 (18)	102 (17)	127 (14)
Overseas resident	1 (<1)	1 (<1)	0 (0)
<b>Rurality (of domicile)</b>			
Urban 1 (most urban)	336 (61)	363 (62)	600 (66)
Urban 2	111 (20)	128 (22)	155 (17)
Rural 1	56 (10)	58 (10)	103 (11)
Rural 2	35 (6)	32 (5)	41 (5)
Rural 3 (most rural)	9 (2)	8 (1)	9 (<1)
Overseas resident	1 (<1)	1 (<1)	0 (0)
Domicile not reported	0 (0)	0 (0)	1 (<1)

### 3.2.2 Characteristics of transplant recipients (Auckland)

Given that Auckland is the largest transplant centre with the largest number of transplant recipients, the characteristics of recipients broadly mirror the overall trends in recipient characteristics in New Zealand. The median age, and proportion of males and females, and blood groups were fairly constant over time. However, the proportion of Māori and Pacific Peoples receiving transplants have decreased during the period, while the proportion of Europeans increased.

Table 3.2 provides further detail on the characteristics of transplant recipients in Auckland.

**Table 3.2: Characteristics of Auckland kidney transplant recipients by 5-year period**

Characteristic, n (%)	2005 - 2009	2010 - 2014	2015 - 2019
<b>Total</b>	284 (100)	348 (100)	576 (100)
<b>Age, median (IQR)</b>	47 (32, 56)	49 (33, 59)	50 (38, 59)
0-17	28 (10)	28 (8)	38 (7)
18-44	98 (35)	116 (33)	175 (30)
45-54	71 (25)	74 (21)	155 (27)
55-64	60 (21)	93 (27)	158 (27)
65+	27 (10)	37 (11)	50 (9)
<b>Sex</b>			
Female	113 (40)	118 (34)	236 (41)
Male	171 (60)	230 (66)	340 (59)
<b>Blood Group</b>			
O	128 (45)	154 (44)	260 (45)
A	112 (39)	144 (41)	211 (37)
B	28 (10)	35 (10)	75 (13)
AB	14 (5)	13 (4)	29 (5)
<b>Ethnicity</b>			
Māori	39 (14)	66 (19)	106 (18)
Pacific Peoples	26 (9)	39 (11)	113 (20)
European	191 (67)	189 (54)	264 (46)
Asian	25 (9)	49 (14)	79 (14)
Other	3 (1)	5 (1)	9 (2)
<b>Deprivation quintile (of domicile)</b>			
1 (most deprived)	79 (28)	100 (29)	185 (32)
2	62 (22)	69 (20)	123 (21)
3	56 (20)	67 (19)	108 (19)
4	49 (17)	70 (20)	98 (17)
5 (least deprived)	37 (13)	42 (12)	62 (11)
<i>Overseas resident</i>	1 (<1)	0 (0)	0 (0)
<b>Rurality (of domicile)</b>			
Urban 1 (most urban)	198 (70)	248 (71)	423 (73)
Urban 2	42 (15)	49 (14)	70 (12)
Rural 1	21 (7)	27 (8)	53 (9)
Rural 2	20 (7)	19 (5)	24 (4)
Rural 3 (most rural)	2 (<1)	5 (1)	6 (1)
<i>Overseas resident</i>	1 (<1)	0 (0)	0 (0)

### 3.2.3 Characteristics of transplant recipients (Wellington)

The characteristics of transplant recipients from the Wellington transplant centre generally align with the trends observed in Auckland. The median age of recipients is slightly lower than that in Christchurch across each 5-year period, but comparable to Auckland. Like Auckland and Christchurch, a larger proportion of transplant recipients in Wellington are of European ethnicity, with this proportion increasing over time. Table 3.3 provides a detailed breakdown of the characteristics of transplant recipients at the Wellington transplant centre over time.

**Table 3.3: Characteristics of Wellington kidney transplant recipients by 5-year period**

Characteristic, n (%)	2005 - 2009	2010 - 2014	2015 - 2019
<b>Total</b>	124 (100)	152 (100)	176 (100)
<b>Age, median (IQR)</b>	46 (36, 57)	50 (40, 60)	51 (36, 58)
0-17	3 (2)	0 (0)	0 (0)
18-44	56 (45)	50 (33)	67 (38)
45-54	28 (23)	43 (28)	41 (23)
55-64	28 (23)	43 (28)	58 (33)
65+	9 (7)	16 (11)	10 (6)
<b>Sex</b>			
Female	49 (40)	46 (30)	66 (38)
Male	75 (60)	106 (70)	110 (63)
<b>Blood Group</b>			
O	62 (50)	55 (36)	79 (45)
A	47 (38)	76 (50)	66 (38)
B	10 (8)	16 (11)	21 (12)
AB	4 (3)	5 (3)	10 (6)
<b>Ethnicity</b>			
Māori	13 (10)	15 (10)	23 (13)
Pacific Peoples	6 (5)	9 (6)	30 (17)
European	100 (81)	119 (78)	93 (53)
Asian	4 (3)	9 (6)	18 (10)
Other	1 (<1)	0 (0)	12 (7)
<b>Deprivation quintile (of domicile)</b>			
1 (most deprived)	22 (18)	32 (21)	41 (23)
2	36 (29)	34 (22)	42 (24)
3	15 (12)	27 (18)	33 (19)
4	20 (16)	20 (13)	31 (18)
5 (least deprived)	31 (25)	39 (26)	29 (16)
<b>Rurality (of domicile)</b>			
Urban 1 (most urban)	58 (47)	55 (36)	87 (49)
Urban 2	52 (42)	69 (45)	66 (38)
Rural 1	12 (10)	21 (14)	17 (10)
Rural 2	1 (<1)	6 (4)	6 (3)
Rural 3 (most rural)	1 (<1)	1 (<1)	0 (0)

### 3.2.4 Christchurch transplant centre patient characteristics

Table 3.4 shows the characteristics of transplant recipients at Christchurch over each 5-year period. As a smaller transplant centre, there are smaller numbers of transplant recipients from Christchurch in each 5-year period compared to Auckland and Wellington. The distributions in sex and blood group are relatively similar to that of Auckland and Wellington. While the proportion of transplant recipients of European ethnicity have increased over time, this proportion is larger than that of Auckland, with over 80% of transplant recipients being of European ethnicity, compared to 46% to 67% at Auckland. Consequently, there are not many Māori and Pacific Peoples receiving transplants at Christchurch. Additionally, recipients classified as the most deprived are a smaller proportion compared to Auckland and Wellington.

**Table 3.4: Characteristics of Christchurch kidney transplant recipients by 5-year period**

Characteristic, n (%)	2005 - 2009	2010 - 2014	2015 - 2019
<b>Total</b>	140 (100)	90 (100)	157 (100)
<b>Age, median (IQR)</b>	50 (40, 57)	51 (45, 59)	52 (41, 61)
0-17	2 (1)	0 (0)	0 (0)
18-44	51 (36)	22 (24)	47 (30)
45-54	33 (24)	32 (36)	46 (29)
55-64	45 (32)	31 (34)	46 (29)
65+	9 (6)	5 (6)	18 (11)
<b>Sex</b>			
Female	59 (42)	35 (39)	51 (32)
Male	81 (58)	55 (61)	106 (68)
<b>Blood Group</b>			
O	67 (48)	43 (48)	80 (51)
A	59 (42)	34 (38)	53 (34)
B	11 (8)	11 (12)	22 (14)
AB	3 (2)	2 (2)	2 (1)
<b>Ethnicity</b>			
Māori	10 (7)	6 (7)	12 (8)
Pacific Peoples	2 (1)	1 (1)	6 (4)
European	125 (89)	77 (86)	125 (80)
Asian	3 (2)	4 (4)	11 (7)
Other	0 (0)	2 (2)	2 (1)
<b>Deprivation quintile (of domicile)</b>			
1 (most deprived)	12 (9)	4 (4)	24 (15)
2	30 (21)	22 (24)	29 (18)
3	32 (23)	18 (20)	29 (18)
4	33 (24)	24 (27)	38 (24)
5 (least deprived)	33 (24)	21 (23)	36 (23)
<i>Overseas resident</i>	0 (0)	1 (1)	0 (0)
<b>Rurality (of domicile)</b>			
Urban 1 (most urban)	80 (57)	60 (67)	90 (57)
Urban 2	17 (12)	10 (11)	19 (12)
Rural 1	23 (16)	10 (11)	33 (21)
Rural 2	14 (10)	7 (8)	11 (7)
Rural 3 (most rural)	6 (4)	2 (2)	3 (2)
<i>Overseas resident</i>	0 (0)	1 (1)	0 (0)
<i>Domicile not reported</i>	0 (0)	0 (0)	1 (<1)

### 3.3 CHARACTERISTICS OF PEOPLE WITH A FUNCTIONING TRANSPLANT

#### 3.3.1 Characteristics of people with a functioning transplant (Overall)

Table 3.5 shows the characteristics of people with a functioning transplant in New Zealand at the end of each 5-year period. The median age has increased over time, from 51 years at the end of 2005 to 60 years at the end of 2019, while the distribution of sex did not show much variation. The proportion of people of European ethnicity decreased from 74% at the end of 2005 to 68% at the end of 2019, while the proportion of people of Māori, Pacific Peoples and Asian ethnicity showed a slight increase. When comparing deprivation scores and rurality of the domiciles of people living with a transplant, there did not seem to be any significant changes over time, with the proportion of people remaining fairly constant throughout the time period.



**Table 3.5 : Characteristics of people alive with functioning transplant at end of each 5-year period**

Characteristic, n (%)	2005		2010		2015		2019	
<b>Total</b>	2,439	(100)	2,997	(100)	3,620	(100)	4,368	(100)
Auckland	987	(40)	1,271	(42)	1,638	(45)	2,109	(48)
Wellington	676	(28)	806	(27)	943	(26)	1,072	(25)
Christchurch	496	(20)	615	(21)	707	(20)	830	(19)
Waikato <sup>1</sup>	174	(7)	169	(6)	165	(5)	164	(4)
Overseas	106	(4)	136	(5)	167	(5)	193	(4)
<b>Age, median (IQI)</b>	51	(40-62)	55	(44-65)	58	(47-68)	60	(49-70)
0-17	61	(3)	53	(2)	54	(1)	63	(1)
18-44	809	(33)	762	(25)	698	(19)	757	(17)
45-54	602	(25)	719	(24)	792	(22)	817	(19)
55-64	524	(21)	715	(24)	918	(25)	1,120	(26)
65+	443	(18)	748	(25)	1,158	(32)	1,611	(37)
<b>Sex</b>								
Female	988	(41)	1,196	(40)	1,400	(39)	1,698	(39)
Male	1,451	(59)	1,801	(60)	2,220	(61)	2,670	(61)
<b>Blood Group</b>								
O	999	(42)	1,248	(42)	1,533	(43)	1,871	(43)
A	1,071	(45)	1,305	(44)	1,547	(43)	1,815	(42)
B	240	(10)	290	(10)	360	(10)	464	(11)
AB	93	(4)	115	(4)	136	(4)	171	(4)
<i>Not reported</i>	36	(1)	39	(1)	44	(1)	47	(1)
<b>Ethnicity</b>								
Māori	313	(13)	395	(13)	497	(14)	606	(14)
Pacific Peoples	165	(7)	204	(7)	268	(7)	394	(9)
European	1,802	(74)	2,188	(73)	2,560	(71)	2,947	(68)
Asian	139	(6)	186	(6)	264	(7)	365	(8)
Other	11	(<1)	14	(<1)	21	(<1)	37	(<1)
<i>Not reported</i>	9	(<1)	10	(<1)	10	(<1)	19	(<1)
<b>Deprivation quintile</b>								
1 (most deprived)	536	(24)	665	(24)	804	(23)	1,012	(24)
2	539	(24)	676	(24)	813	(24)	967	(23)
3	462	(21)	560	(20)	690	(20)	830	(20)
4	358	(16)	465	(17)	587	(17)	728	(17)
5 (least deprived)	330	(15)	428	(15)	531	(16)	642	(15)
<i>Overseas resident</i>	6	(<1)	7	(<1)	9	(<1)	10	(<1)
<i>Domicile not reported</i>	208	(9)	196	(7)	186	(5)	179	(4)
<b>Rurality (of domicile)</b>								
Urban 1 (most urban)	1,377	(66)	1,732	(65)	2,145	(65)	2,645	(65)
Urban 2	408	(19)	525	(20)	650	(20)	775	(19)
Rural 1	205	(10)	262	(10)	318	(10)	410	(10)
Rural 2	95	(5)	130	(5)	160	(5)	193	(5)
Rural 3 (most rural)	11	(<1)	20	(<1)	26	(<1)	35	(<1)
<i>Overseas resident</i>	6	(<1)	7	(<1)	9	(<1)	10	(<1)
<i>Domicile not reported</i>	337	(14)	321	(11)	312	(9)	300	(7)

<sup>1</sup> Kidney transplants were performed at Waikato hospital in Hamilton until 2001

### 3.3.2 Characteristics of people with a functioning transplant (Auckland)

Table 3.6 summarises characteristics of people living with a functioning transplant from Auckland transplant centre at the end of each 5-year period. The median age increased at the end of each 5-year period, while the proportion of females remained relatively constant at around 40%. Additionally, the proportion of people of European ethnicity decreased over time (although the absolute number of people increased), and the proportion of Māori, Pacific Peoples, and Asian people increased over time. Deprivation and rurality by domicile did not vary greatly over the study period.

**Table 3.6: Characteristics of people with functioning transplant at end of 5 year-period, Auckland**

Characteristic, n (%)	2005	2010	2015	2019
<b>Total</b>	987 (100)	1,271 (100)	1,638 (100)	2,109 (100)
<b>Age, median (IQR)</b>	49 (39-60)	53 (42-63)	57 (44-66)	58 (46-68)
0-17	43 (4)	46 (4)	53 (3)	62 (3)
18-44	344 (35)	337 (27)	370 (23)	445 (21)
45-54	242 (25)	318 (25)	343 (21)	379 (18)
55-64	210 (21)	298 (23)	412 (25)	543 (26)
65+	148 (15)	272 (21)	460 (28)	680 (32)
<b>Sex</b>				
Female	394 (40)	502 (39)	622 (38)	823 (39)
Male	593 (60)	769 (61)	1,016 (62)	1,286 (61)
<b>Blood Group</b>				
O	410 (42)	537 (42)	713 (44)	920 (44)
A	447 (45)	565 (44)	701 (43)	876 (42)
B	94 (10)	120 (9)	158 (10)	223 (11)
AB	36 (4)	49 (4)	66 (4)	90 (4)
<b>Ethnicity</b>				
Māori	137 (14)	190 (15)	261 (16)	343 (16)
Pacific Peoples	115 (12)	142 (11)	190 (12)	284 (13)
European	660 (67)	830 (65)	1,023 (63)	1,239 (59)
Asian	65 (7)	96 (8)	148 (9)	217 (10)
Other	7 (<1)	10 (<1)	13 (<1)	23 (1)
<i>Not reported</i>	3 (<1)	3 (<1)	3 (<1)	3 (<1)
<b>Deprivation quintile</b>				
1 (most deprived)	270 (29)	358 (29)	461 (29)	614 (30)
2	185 (20)	248 (20)	330 (21)	425 (21)
3	203 (22)	257 (21)	329 (21)	416 (20)
4	162 (18)	213 (18)	287 (18)	367 (18)
5 (least deprived)	105 (11)	138 (11)	176 (11)	233 (11)
<i>Overseas resident</i>	2 (<1)	3 (<1)	3 (<1)	3 (<1)
<i>Domicile not reported</i>	60 (6)	54 (4)	52 (3)	51 (2)
<b>Rurality (of domicile)</b>				
Urban 1 (most urban)	708 (80)	910 (77)	1,183 (76)	1,524 (75)
Urban 2	91 (10)	131 (11)	184 (12)	241 (12)
Rural 1	51 (6)	77 (7)	102 (7)	149 (7)
Rural 2	32 (4)	53 (4)	67 (4)	89 (4)
Rural 3 (most rural)	4 (<1)	7 (<1)	11 (<1)	17 (<1)
<i>Overseas resident</i>	2 (<1)	3 (<1)	3 (<1)	3 (<1)
<i>Domicile not reported</i>	99 (10)	90 (7)	88 (5)	86 (4)

### 3.3.3 Characteristics of people with a functioning transplant (Wellington)

Table 3.3 summarises characteristics of people with a functioning transplant from Wellington. Similar to national trends, the median age increased over time, while the proportion of females remained relatively constant at around one-third. However, the proportion of Māori people decreased slightly while the proportion of European and Pacific Peoples remained somewhat constant over the study period. The proportion of people in each deprivation quintile and rurality of domiciles remained constant throughout.

**Table 3.7: Characteristics of people with functioning transplant at end of 5 year-period, Wellington**

Characteristic, n (%)	2005	2010	2015	2019
<b>Total</b>	676 (100)	806 (100)	943 (100)	1,072 (100)
<b>Age, median (IQR)</b>	53 (42-65)	57 (45-68)	60 (49-72)	62 (52-74)
0-17	11 (2)	4 (<1)	0 (0)	0 (0)
18-44	194 (29)	194 (24)	155 (16)	159 (15)
45-54	159 (24)	169 (21)	203 (22)	189 (18)
55-64	148 (22)	182 (23)	224 (24)	266 (25)
65+	164 (24)	257 (32)	361 (38)	458 (43)
<b>Sex</b>				
Female	271 (40)	317 (39)	357 (38)	411 (38)
Male	405 (60)	489 (61)	586 (62)	661 (62)
<b>Blood Group</b>				
O	294 (43)	354 (44)	406 (43)	465 (43)
A	283 (42)	337 (42)	402 (43)	445 (42)
B	77 (11)	87 (11)	103 (11)	122 (11)
AB	22 (3)	28 (3)	32 (3)	40 (4)
<b>Ethnicity</b>				
Māori	105 (16)	118 (15)	136 (14)	152 (14)
Pacific Peoples	32 (5)	39 (5)	49 (5)	74 (7)
European	507 (75)	613 (76)	711 (76)	773 (73)
Asian	28 (4)	31 (4)	42 (4)	57 (5)
Other	2 (<1)	2 (<1)	2 (<1)	5 (<1)
<i>Not reported</i>	2 (<1)	3 (<1)	3 (<1)	11 (1)
<b>Deprivation quintile</b>				
1 (most deprived)	129 (21)	153 (21)	182 (21)	213 (21)
2	179 (29)	218 (29)	247 (28)	275 (27)
3	108 (18)	122 (16)	150 (17)	177 (17)
4	81 (13)	102 (14)	121 (14)	146 (14)
5 (least deprived)	113 (19)	147 (20)	182 (21)	204 (20)
<i>Overseas resident</i>	1 (<1)	1 (<1)	1 (<1)	1 (<1)
<i>Domicile not reported</i>	65 (10)	63 (8)	60 (6)	56 (5)
<b>Rurality (of domicile)</b>				
Urban 1 (most urban)	259 (47)	318 (46)	371 (45)	439 (46)
Urban 2	213 (38)	271 (39)	334 (40)	384 (40)
Rural 1	62 (11)	76 (11)	94 (11)	109 (11)
Rural 2	20 (4)	20 (3)	26 (3)	29 (3)
Rural 3 (most rural)	1 (<1)	3 (<1)	3 (<1)	3 (<1)
<i>Overseas resident</i>	1 (<1)	1 (<1)	1 (<1)	1 (<1)
<i>Domicile not reported</i>	120 (18)	117 (15)	114 (12)	107 (10)

### 3.3.4 Characteristics of people with a functioning transplant (Christchurch)

Table 3.4 summarises characteristics of people living with a functioning transplant from Christchurch transplant centre. Following the national trend, people with a functioning transplant from Christchurch are getting older, and the proportion of females has decreased. The proportion of European people was much higher in Christchurch (90%) compared to other transplant centres. The proportion in the most socio-economically deprived quintiles decreased, while the proportion in rural areas remained stable over time.

**Table 3.8: Characteristics of people with functioning transplant at end of 5 year-period, Christchurch**

Characteristic, n (%)	2005	2010	2015	2019
<b>Total</b>	496 (100)	615 (100)	707 (100)	830 (100)
<b>Age, median (IQR)</b>	52 (41-62)	55 (45-65)	59 (49-69)	62 (52-71)
0-17	3 (<1)	1 (<1)	0 (0)	0 (0)
18-44	166 (33)	149 (24)	107 (15)	105 (13)
45-54	123 (25)	153 (25)	174 (25)	170 (20)
55-64	112 (23)	160 (26)	189 (27)	220 (27)
65+	92 (19)	152 (25)	237 (34)	335 (40)
<b>Sex</b>				
Female	214 (43)	259 (42)	297 (42)	337 (41)
Male	282 (57)	356 (58)	410 (58)	493 (59)
<b>Blood Group</b>				
O	209 (42)	261 (42)	308 (44)	369 (44)
A	221 (45)	275 (45)	307 (43)	348 (42)
B	45 (9)	56 (9)	68 (10)	87 (10)
AB	21 (4)	23 (4)	24 (3)	26 (3)
<b>Ethnicity</b>				
Māori	18 (4)	30 (5)	36 (5)	45 (5)
Pacific Peoples	7 (1)	8 (1)	10 (1)	15 (2)
European	457 (92)	561 (91)	638 (90)	735 (89)
Asian	13 (3)	15 (2)	20 (3)	30 (4)
Other	0 (0)	0 (0)	2 (<1)	4 (<1)
<i>Not reported</i>	1 (<1)	1 (<1)	1 (<1)	1 (<1)
<b>Deprivation quintile</b>				
1 (most deprived)	71 (16)	84 (14)	87 (13)	104 (13)
2	114 (25)	141 (24)	162 (24)	187 (23)
3	110 (24)	133 (23)	156 (23)	179 (22)
4	81 (18)	113 (19)	136 (20)	167 (21)
5 (least deprived)	82 (18)	111 (19)	136 (20)	164 (20)
<i>Overseas resident</i>	0 (0)	0 (0)	1 (<1)	1 (<1)
<i>Domicile not reported</i>	38 (8)	33 (5)	29 (4)	28 (3)
<b>Rurality (of domicile)</b>				
Urban 1 (most urban)	272 (62)	348 (62)	415 (63)	483 (62)
Urban 2	69 (16)	85 (15)	91 (14)	107 (14)
Rural 1	64 (15)	81 (14)	93 (14)	123 (16)
Rural 2	29 (7)	41 (7)	49 (7)	57 (7)
Rural 3 (most rural)	4 (<1)	8 (1)	10 (2)	13 (2)
<i>Overseas resident</i>	0 (0)	0 (0)	1 (<1)	1 (<1)
<i>Domicile not reported</i>	58 (12)	52 (8)	48 (7)	46 (6)

## 4 Special Transplants

### 4.1 MULTI-ORGAN

From 2005 to 2019, there were a total of 56 multi-organ transplants. Of these, 44 (79%) were simultaneous kidney-pancreas transplants, 10 (18%) kidney-liver transplants, one (2%) was kidney-heart and one (2%) was a kidney-heart-lung-pancreas transplant. Table 4.1 shows the number of multi-organ transplants performed from 2005 to 2019.

**Table 4.1: Multi-organ transplants from 2005 to 2019**

Multi-organ transplants	N (%)
Kidney-pancreas	44 (79)
Kidney-liver	10 (18)
Kidney-heart	1 (2)
Kidney, heart, lung, pancreas	1 (2)
<b>Total</b>	<b>56 (100)</b>

### 4.2 BLOOD GROUPS OF KIDNEY DONORS AND TRANSPLANT RECIPIENTS

The number of kidney transplants by donor and recipient blood group are shown in Table 4.2. The majority of transplants were performed between donors and recipients with the same blood group, for example, 858 (77%) transplants were between recipients and donors with blood group O, 622 (87%) were between recipients and donors with blood group A and 153 (86%) were between recipients and donors with blood group B.

**Table 4.2: Number of kidney transplants by donor and recipient blood groups from 2005 to 2019**

Donor	Recipient, n (row %)					Total
	O	A	B	AB		
O	858 (78)	175 (16)	64 (6)	6 (1)		1,103 (100)
A	52 (7)	622 (87)	12 (2)	27 (4)		713 (100)
B	12 (7)	3 (2)	153 (87)	8 (5)		176 (100)
AB	3 (6)	4 (8)	1 (2)	43 (84)		51 (100)
<b>Total</b>	<b>925 (45)</b>	<b>804 (39)</b>	<b>230 (11)</b>	<b>84 (4)</b>		<b>2,047 (100)</b>

Table 4.3 summarises all transplants by donor and recipient blood group compatibility. From 2005-2019 there were 367 (18%) ABO non-identical transplants performed, including 280 (76%) ABO compatible and 87 (24%) ABO incompatible.

**Table 4.3: ABO incompatible and compatible transplants performed in each centre**

Donor-recipient blood group compatibility	N (%)
ABO identical	1,680 (82)
ABO non-identical	367 (18)
<i>ABO compatible</i>	280 (76)
<i>ABO incompatible</i>	87 (24)
<b>Total</b>	<b>2,047 (100)</b>

ABO blood group incompatible (ABOi) transplants are conducted at each centre, with Wellington having conducted its first ABOi in 2019. All centres follow a similar protocol that was developed in Auckland. These transplants are exclusively from living donors. The ABOi program plays a crucial role by facilitating additional directed donations when an ABO compatible donor is not available, including in kidney exchange scenarios.

Out of 2,047 transplants performed in New Zealand from 2005 to 2019, 1,944 (94%) transplants were ABO compatible transplants while there were 87 (4%) ABO incompatible (69 in Auckland, 3 in Wellington and 15 in Christchurch). The distribution of ABO compatible and incompatible transplants are shown in Table 4.4.

**Table 4.4: ABO non-identical transplants by centre**

Transplant centre	N (row %)		Total
	ABO compatible	ABO incompatible	
Auckland	142 (67)	69 (33)	211 (100)
Wellington	76 (96)	3 (4)	79 (100)
Christchurch	62 (81)	15 (19)	77 (100)
<b>Total</b>	<b>280 (76)</b>	<b>87 (24)</b>	<b>367 (100)</b>

## 4.3 LIVING KIDNEY DONORS

### 4.3.1 Directed and non-directed living kidney donors

There were 987 living kidney donors in New Zealand from 2005 to 2019, representing 33% of all transplants performed. These living donors are summarised by donor type and transplant centre in Table 4.5. There were 902 directed living kidney donors from 2005 to 2019, including 20 (2%) who participated in the kidney exchange. New Zealand experiences a significant level of non-directed (altruistic) living kidney donations. From 2005 to 2019, there were 85 non-directed live kidney donors (23 in Auckland, 26 in Wellington and 25 in Christchurch). Of these, 74 (87%) were donated via the deceased donor waiting list, while 11 (12%) were donated via the kidney exchange.

**Table 4.5: Living donors in New Zealand by donor type, 2005 to 2019**

Living donor type	N (column %)			
	Auckland	Wellington	Christchurch	Total
Directed	489 (94)	205 (89)	208 (88)	902 (91)
<i>Kidney exchange</i>	15 (3)	2 (1)	3 (1)	20 (2)
Non-directed	30 (6)	26 (11)	29 (12)	85 (9)
<i>Waiting list</i>	23 (77)	25 (96)	26 (90)	74 (87)
<i>Kidney exchange</i>	7 (23)	1 (4)	3 (10)	11 (13)
<b>Total</b>	<b>519 (100)</b>	<b>231 (100)</b>	<b>237 (100)</b>	<b>987 (100)</b>

### 4.3.2 Paired exchange

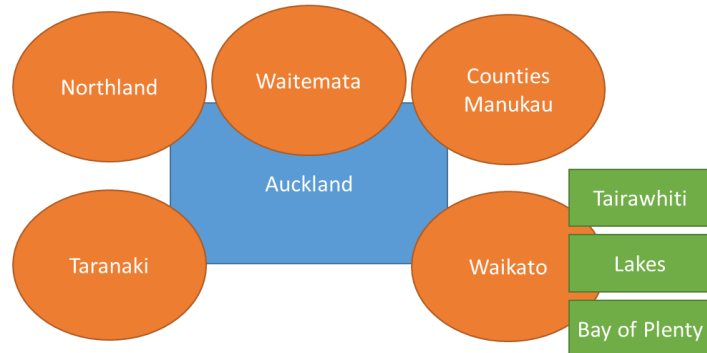
In October 2019, the Australian Paired Kidney Exchange and the New Zealand Kidney Exchange cooperated to form the Australian and New Zealand Paired Kidney Exchange (ANZKX). This program encourages kidney donor-recipient pairs who are incompatible to join the exchange, thereby facilitating additional live donor transplants through matched exchanges. Transplants within the ANZKX can occur either within or across transplant centres, including those in Australia.

During 2005 to 2019, 33 kidney transplants in New Zealand were received through the exchange program. Since this period only includes 3 months of data since the formation of the ANZKX, only 2 of these transplants were from Australian donors, while the remaining 31 were from New Zealand donors.

# Appendix 1 Arrangement of DHBs for Kidney Transplant Services

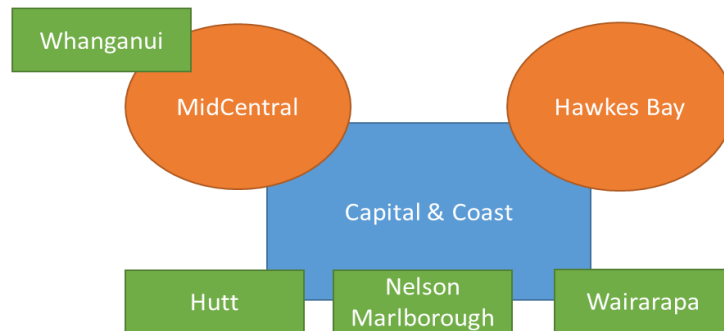
Figure App 1 Arrangement of DHBs for kidney transplant services in New Zealand

## Auckland Renal Transplant Group

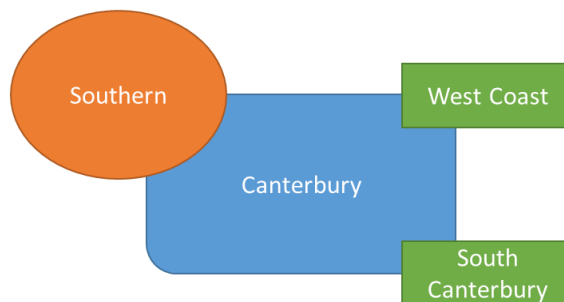


Auckland provide national kidney transplantation services for all other DHBs: Kidney-Pancreas, ABO incompatible (except Canterbury) and paediatric transplantation

## Wellington Renal Transplant Service



## South Island Kidney Transplant Committee



Legend:  
■ Transplanting DHBs  
■ DHBs with comprehensive dialysis services  
■ DHBs without comprehensive dialysis services