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Estimating Diabetes-Related Mortality Using the Mortality Collection and Hospitalisation Data

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1 Introduction

Data recorded from death certificates is the most common information used to calculate the prevalence of diabetes-related deaths. However, a number of studies both in New Zealand and worldwide has shown that this method consistently under-report deaths resulting from diabetes (Balkau & Papoz, 1992; Chen, Florkowski, Dever, & Beaven, 2004; Fuller, Elford, Goldblatt, & Adelstein, 1983; Riley et al., 1995). One possible method to improve the accuracy of diabetes-related death statistics is to link the mortality records with other health databases, such as those collected in primary or secondary care. A previous study in New Zealand used additional data sources to estimate the rate of under-reporting for diabetes-related deaths. Coppell, McBride and Williams (Coppell, McBride, & Williams, 2004) used the Otago Diabetes Register to show that diabetes was mentioned on the death certificates of just over half of those on the Register who had died before the end of 2003.

Another study by Jeffreys et al. (Jeffreys, Wright, t Mannelje, Huang, & Pearce, 2005) used mortality data to supplement a cohort of patients from the hospital discharge data in order to calculate standardised mortality rates for different ethnic groups. Their results showed that mortality rates were substantially higher than the figures that result from using mortality data alone, although the authors acknowledge that their sample was probably over-represented by more severe cases. There appears to have been no previous study in New Zealand linking mortality records with hospitalisation data to investigate the benefit of this for reporting diabetes-related deaths.

The main aim of this study was to use hospitalisation records to estimate the degree of under-reporting of diabetes in death certificate data where Cardio-Vascular Disease (CVD) or Chronic Renal Failure (CRF) were recorded as the underlying cause of death. From knowing the magnitude of under-reporting, it was also hypothesised that mortality rates could be adjusted to provide a more accurate measure of diabetes-related deaths in New Zealand. In particular, this project was interested in the benefits of using adjusted mortality rates, obtained through the linking of mortality and

hospital data, as an outcome measure for evaluating the effectiveness of the Let's Beat Diabetes programme in Counties Manukau.

2 Methods

The methodology presented in this report represents the first stage in a project aimed at more accurately estimating the prevalence of diabetes-related deaths in New Zealand. Mortality and hospitalisation data were used to estimate the under-reporting of diabetes diagnoses in cases where a person died from CVD or CRF. The additional cases identified were then added to those deaths officially recorded as diabetes-related to produce adjusted mortality rates that should better reflect the actual contribution of diabetes to death statistics in New Zealand. All analyses were conducted at a national and DHB level, so that the results might be used in the future for the evaluation of changes in diabetes-related deaths resulting from Let's Beat Diabetes.

2.1 Data

2.1.1 National Minimum Data Set

The National Minimum Data Set (NMDS) is a national collection of public and private hospital discharge information, including clinical information, for inpatients and day patients. Individual record data is collected and stored at the DHB level, then cleaned and collated by the New Zealand Health Information Service (NZHIS). As the evaluation team are contracted by CMDHB, it was possible for the DHB to provide their own copy of the NMDS for the purposes of this analysis. The NMDS data used in this study covered all hospital discharge records between January 2000 and December 2004.

The following procedures were undertaken to prepare the data for analysis:

- Original SAS files received from CMDHB imported in SPSS and merged to form one dataset spanning the period from January 2000 to December 2004.
- The 15 diagnostic codes in the data were shortened to 3 characters to allow for easier grouping of conditions.
- The data was restructured so that each record showed all hospitalisation events for each person.
- A new binary variable, **DiabetesAny**, was created to identify people who had a Type II diabetes (E11) code in any of the diagnostic fields, for any of their records.

2.1.2 Mortality Collection

The Mortality Collection has been established to provide data for public health research, policy formulation, development and monitoring, and cancer survival studies. A complete dataset of mortality data is sent to the World Health Organization each year to be used in international comparisons of mortality statistics. The NZHIS Mortality Collection classifies the underlying cause of death for all deaths registered in New Zealand, including all registered fetal deaths (stillbirths), using the ICD-10-AM 2nd Edition and the WHO Rules and Guidelines for Mortality Coding. The Mortality Collection also records contributing causes of death. NZHIS also provides the DHB domicile for each record, which is the DHB area in which the person died. The following procedures were undertaken to prepare the data for analysis:

- Original SAS files received from NZHIS were imported into SPSS; one main mortality file containing single records for each person, and the other containing clinical codes.
- All records outside the period from January 2000 to December 2004 were removed.
- Age at death was calculated and grouped into the following bands:
 - ≤14 yrs
 - 15-24 yrs
 - 25-44 yrs
 - 45-64 yrs
 - 65+ yrs
- Prioritised ethnicity was calculated using the following order:
 - Maori
 - Pacific Island
 - Asian
 - Other
 - European
- The clinical codes data was then separated into the different code types, with type D (Underlying Cause) F (Contributing Cause B1) and G (Contributing Cause B2) codes being kept for analysis. Each case had a single underlying cause and up to 11 contributory causes.

- ICD 10 clinical codes were shortened to 3 characters to allow for easier grouping of conditions.
- The clinical codes were then linked to the main mortality file.
- Three new binary variables were created:
 - **DiabetesUnderlying** – identifies cases where the underlying cause of death was Type II diabetes (E11).
 - **DiabetesContributory** – identifies cases where Type II diabetes (E11) was included as a contributory factor.
 - **DiabetesUnderContrib** – identifies cases where Type II diabetes (E11) was either the underlying cause of death or was included as a contributory factor.
- The variable identifying if a person had been coded with a Type II diabetes diagnosis in the NMDS (**DiabetesAny**) was linked to the mortality data.

2.2 Analysis

There were four steps in the analysis:

- 1) Calculating raw diabetes-related death rates, as a raw percentage of total deaths, from the Mortality Collection data.
- 2) Calculating the number of deaths from diabetes-related conditions (CVD and CRF) where there was no Type II diabetes code in the Mortality Collection but diabetes was found in the hospitalisation data.
- 3) Calculating the under-reporting rate of diabetes for diabetes-related conditions, as the percentage difference between the raw diabetes-related death rates for the condition and the rate when cases identified from the NMDS were added.
- 4) Total diabetes-related death rates were then recalculated by using the linked records from the CVD and CRF analysis in step 2, and the percentage difference between the original raw death rate and the new adjusted death rate was calculated.

3 Results

The Mortality Collection from January 2000 to December 2004 contained records for 138,960 deaths. Table 1 shows the total number of deaths in each DHB region.

Table 1: Total Number of Deaths by DHB Region

DHB Region	Total Number of Deaths
Northland	6007
Waitemata	12862
Auckland	12184
Counties Manukau	10652
Waikato	11562
Lakes	3645
Bay of Plenty	7549
Tairāwhiti	1917
Hawke's Bay	6248
Taranaki	4502
Mid Central	6656
Whanganui	3022
Capital and Coast	7623
Hutt Valley	4665
Wairarapa	1727
Nelson Marlborough	5087
West Coast	1294
Canterbury	16709
South Canterbury	2649
Otago	7472
Southern	4206
Unknown	722
Total	138960

3.1 Diabetes-Related Deaths from the Mortality Collection (Jan 2000-Dec 2004)

Table 2 shows the number and percentage of deaths in the mortality data, in each DHB region and nationally, which had Type II diabetes (ICD 10 three character code: E11) recorded as the underlying cause or a contributory cause. Figure 1 shows that Northland, Counties Manukau and Lakes regions had the highest rates of diabetes-related deaths as a percentage of all deaths in the region.

Table 2: Number and Percentage of Deaths where Diabetes is Recorded as Underlying or Contributory Cause

DHB Region	Diabetes as Underlying Cause				Diabetes as Contributory Condition				Diabetes as Underlying Cause or Contributory Condition			
	No		Yes		No		Yes		No		Yes	
	N	% of Deaths	N	% of Deaths	N	% of Deaths	N	% of Deaths	N	% of Deaths	N	% of Deaths
Northland	5761	95.9	246	4.1	5639	93.9	368	6.1	5426	90.3	581	9.7
Waitemata	12626	98.2	236	1.8	12229	95.1	633	4.9	12015	93.4	847	6.6
Auckland	11887	97.6	297	2.4	11508	94.5	676	5.5	11244	92.3	940	7.7
Counties Manukau	10276	96.5	376	3.5	9963	93.5	689	6.5	9634	90.4	1018	9.6
Waikato	11259	97.4	303	2.6	10889	94.2	673	5.8	10621	91.9	941	8.1
Lakes	3500	96.0	145	4.0	3398	93.2	247	6.8	3273	89.8	372	10.2
Bay of Plenty	7351	97.4	198	2.6	7197	95.3	352	4.7	7023	93.0	526	7.0
Tairāwhiti	1841	96.0	76	4.0	1833	95.6	84	4.4	1768	92.2	149	7.8
Hawke's Bay	6112	97.8	136	2.2	5909	94.6	339	5.4	5784	92.6	464	7.4
Taranaki	4384	97.4	118	2.6	4216	93.6	286	6.4	4108	91.2	394	8.8
Mid Central	6521	98.0	135	2.0	6369	95.7	287	4.3	6249	93.9	407	6.1
Whanganui	2922	96.7	100	3.3	2871	95.0	151	5.0	2781	92.0	241	8.0
Capital and Coast	7411	97.2	212	2.8	7225	94.8	398	5.2	7036	92.3	587	7.7
Hutt Valley	4532	97.1	133	2.9	4449	95.4	216	4.6	4330	92.8	335	7.2
Wairarapa	1678	97.2	49	2.8	1648	95.4	79	4.6	1604	92.9	123	7.1
Nelson												
Marlborough	5002	98.3	85	1.7	4840	95.1	247	4.9	4766	93.7	321	6.3
West Coast	1256	97.1	38	2.9	1226	94.7	68	5.3	1189	91.9	105	8.1
Canterbury	16425	98.3	284	1.7	15925	95.3	784	4.7	15666	93.8	1043	6.2
South Canterbury	2590	97.8	59	2.2	2528	95.4	121	4.6	2474	93.4	175	6.6
Otago	7313	97.9	159	2.1	7080	94.8	392	5.2	6933	92.8	539	7.2
Southern	4105	97.6	101	2.4	4010	95.3	196	4.7	3917	93.1	289	6.9
Unknown	712	98.6	10	1.4	700	97.0	22	3.0	691	95.7	31	4.3
Total	135464	97.5	3496	2.5	131652	94.7	7308	5.3	128532	92.5	10428	7.5

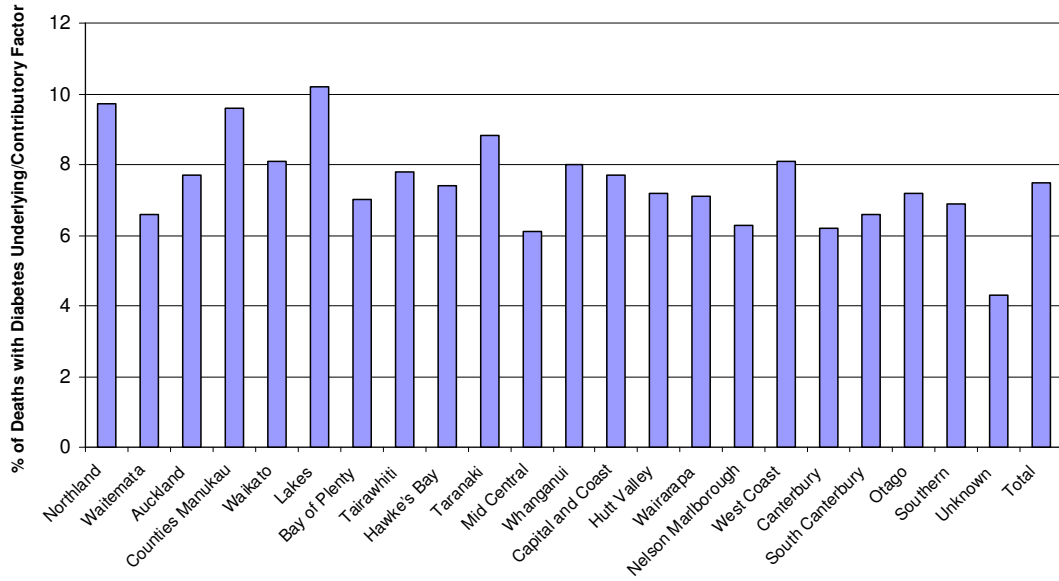


Figure 1: Percentage of Deaths where Diabetes is Underlying/Contributory Cause, by DHB Region

3.1.1 Diabetes-Related Deaths and their Relationship with Age, Gender and Ethnicity

Error! Reference source not found. Figure 2 shows that nationally there is a greater number of males than females who have diabetes recorded on their death certificate as either the underlying cause or a contributing factor. It also shows, however, that the reverse is true for deaths recorded for people living in Counties Manukau, where a greater proportion of females than males have diabetes recorded on their death certificate.

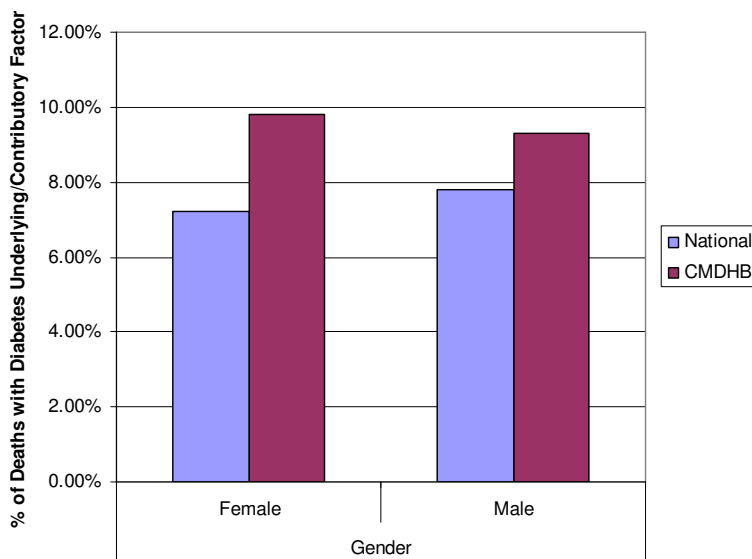


Figure 2: Percentage of Deaths where Diabetes is Underlying/Contributory Cause, by Gender (National vs Counties Manukau)

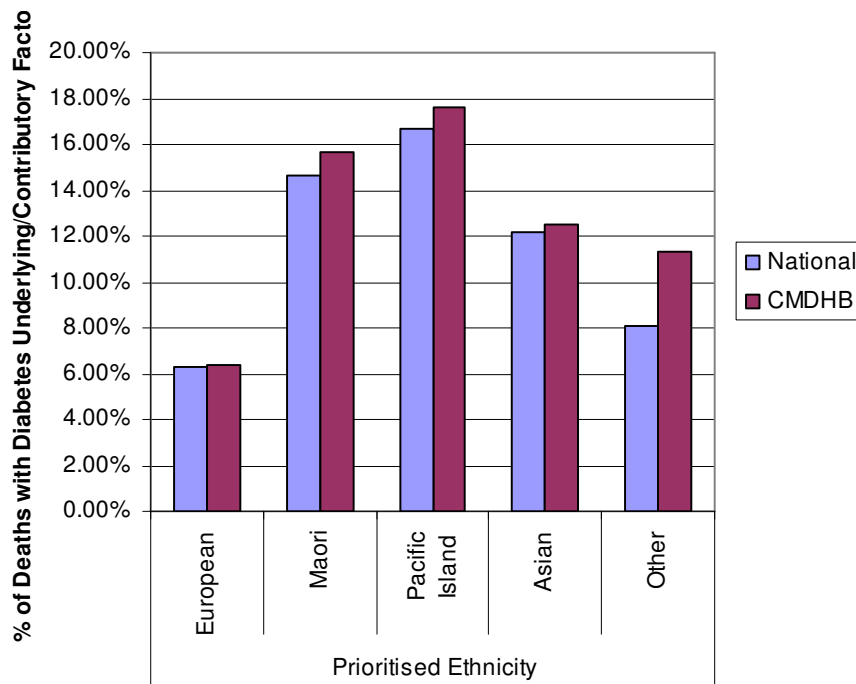


Figure 3: Percentage of Deaths where Diabetes is Underlying/Contributory Cause, by Ethnicity (National vs Counties Manukau)

Figure 3 shows that Counties Manukau had a similar pattern of deaths to the national statistics in terms of the percentage of deaths within each ethnic group that had diabetes recorded as an underlying or contributory factor on their death certificate. Pacific Island peoples demonstrated the highest rate of diabetes-related deaths, followed in decreasing order by Maori, Asian, Other and European. Counties Manukau did, however, have consistently higher rates of diabetes-related deaths in all ethnic groups except for Europeans.

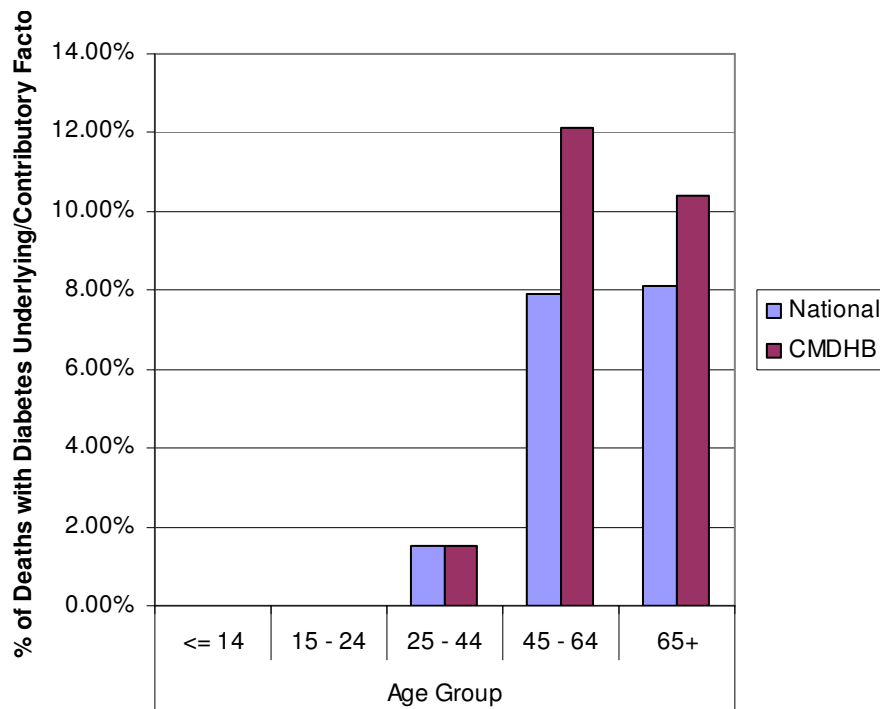


Figure 4: Percentage of Deaths where Diabetes is Underlying/Contributory Cause, by Age Group (National vs Counties Manukau)

Figure 4 shows that the majority of diabetes-related deaths occurred in people over the age of 44. Nationally there was very little difference in diabetes-related death rates between the 45-64 year old group and the 65 year and over age group, but in Counties Manukau diabetes-related deaths were more common in the 45-64 year old group than the 65 year and over age group. Counties Manukau also had consistently higher rates of diabetes-related deaths than the national statistics in both of these older age groups.

Table 3: Diabetes-Related Deaths by Age, Gender and Ethnicity (National)

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	64031	92.8%	5000	7.2%	69031	100.0%
	Male	64500	92.2%	5428	7.8%	69928	100.0%
Prioritised Ethnicity	European	110668	93.7%	7404	6.3%	118072	100.0%
	Maori	11232	85.4%	1915	14.6%	13147	100.0%
	Pacific Island	3810	83.3%	765	16.7%	4575	100.0%
	Asian	2196	87.8%	306	12.2%	2502	100.0%
	Other	372	91.9%	33	8.1%	405	100.0%
Age Group	<= 14	2515	100.0%	0	.0%	2515	100.0%
	15 - 24	1934	100.0%	0	.0%	1934	100.0%
	25 - 44	6054	98.5%	90	1.5%	6144	100.0%
	45 - 64	19365	92.1%	1662	7.9%	21027	100.0%
	65+	98664	91.9%	8676	8.1%	107340	100.0%

Table 4: Diabetes-Related Deaths by Age, Gender and Ethnicity (Counties Manukau)

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	4606	90.2%	502	9.8%	5108	100.0%
	Male	5027	90.7%	516	9.3%	5543	100.0%
Prioritised Ethnicity	European	6695	93.6%	455	6.4%	7150	100.0%
	Maori	1171	84.3%	218	15.7%	1389	100.0%
	Pacific Island	1312	82.4%	281	17.6%	1593	100.0%
	Asian	405	87.5%	58	12.5%	463	100.0%
	Other	47	88.7%	6	11.3%	53	100.0%
Age Group	<= 14	386	100.0%	0	.0%	386	100.0%
	15 - 24	222	100.0%	0	.0%	222	100.0%
	25 - 44	672	98.5%	10	1.5%	682	100.0%
	45 - 64	1805	87.9%	249	12.1%	2054	100.0%
	65+	6549	89.6%	759	10.4%	7308	100.0%

3.2 Diabetes-Related Deaths from the Mortality Collection by Year

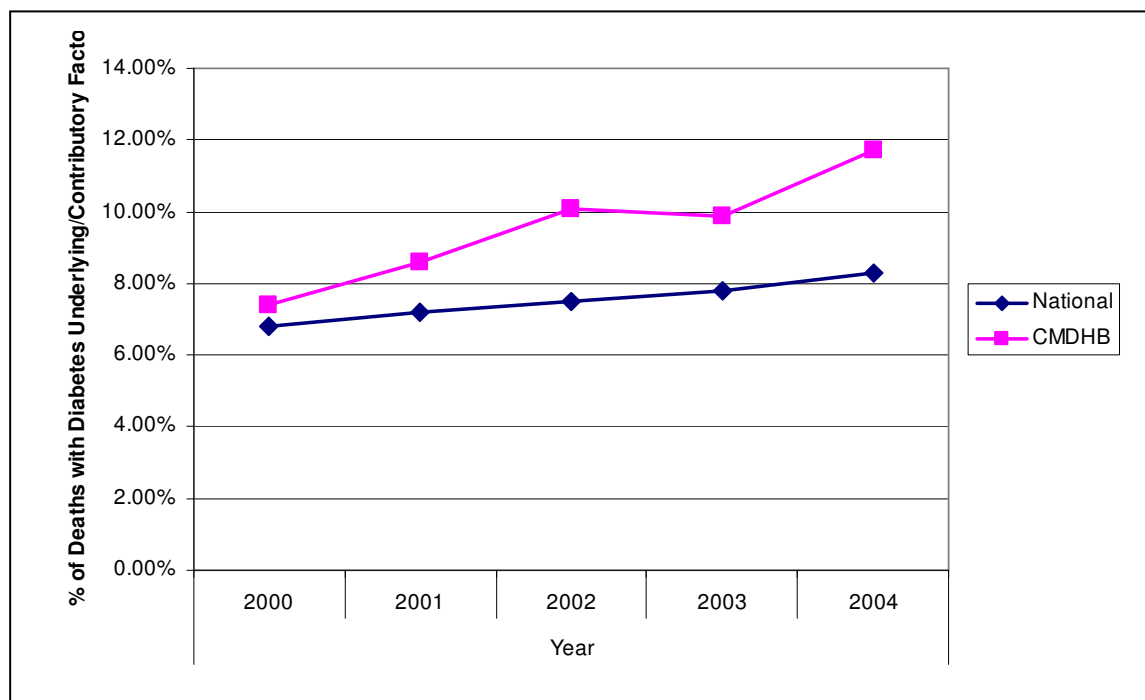


Figure 5: Percentage of Deaths where Diabetes is Underlying/Contributory Cause, by Year (National vs Counties Manukau)

Table 5: Diabetes-Related Deaths by Year (National)

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	25028	93.2%	1814	6.8%	26842	100.0%
	2001	26054	92.8%	2007	7.2%	28061	100.0%
	2002	26164	92.5%	2115	7.5%	28279	100.0%
	2003	25790	92.2%	2189	7.8%	27979	100.0%
	2004	25496	91.7%	2303	8.3%	27799	100.0%

Table 6: Diabetes-Related Deaths by Year (Counties Manukau)

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	1877	92.6%	150	7.4%	2027	100.0%
	2001	1979	91.4%	186	8.6%	2165	100.0%
	2002	1955	89.9%	220	10.1%	2175	100.0%
	2003	2005	90.1%	221	9.9%	2226	100.0%
	2004	1818	88.3%	241	11.7%	2059	100.0%

3.3 Under-Reporting of Diabetes Diagnoses in Death Certificate Data

Through linking the hospitalisation data (NMDS) to the mortality data (MC) it was found that, nationwide, 85.1% of those with diabetes recorded on their death certificate also had a previous hospital record (between 2000 and 2004) with a diagnosis of Type II diabetes in their discharge information. The linkage rate for Counties Manukau was higher, with an 88.8% match. The data linkage also revealed a large number of cases where diabetes was recorded in the hospital records, but was not recorded in the death certificate data. Nationwide 6.6% of cases, where diabetes was not recorded on the death certificate, had a diabetes diagnosis recorded in the hospital data. This figure was higher for Counties Manukau, with 7.4% not having diabetes recorded on their death certificate.

Table 7: Number and Percentage of Cases Matching Diabetes Diagnoses after Linking the Hospital and Mortality Data (National)

	Diabetes is underlying/contributory cause					
	No		Yes		Total	
Diabetes Recorded in Hospital Records	N	%	N	%	N	%
Diabetes	8472	6.6%	8875	85.1%	17347	12.5%
No Diabetes Code	94881	73.8%	494	4.7%	95375	68.6%
No Hospital Record	25179	19.6%	1059	10.2%	26238	18.9%

Table 8: Number and Percentage of Cases Matching Diabetes Diagnoses after Linking the Hospital and Mortality Data (Counties Manukau)

	Diabetes is underlying/contributory cause					
	No		Yes		Total	
Diabetes Recorded in Hospital Records	N	%	N	%	N	%
Diabetes	715	7.4%	904	88.8%	1619	15.2%
No Diabetes Code	7051	73.2%	22	2.2%	7073	66.4%
No Hospital Record	1868	19.4%	92	9.0%	1960	18.4%

3.4 Diabetes Coding Where CVD & CRF are Underlying Cause of Death

Not all people who have diabetes die from diabetes-related deaths, so the next step of the analysis focused on finding the number of cases where diabetes was not recorded on the death certificate but was found in the hospital data, and the person died from a condition known to be highly related to diabetes. The conditions used in this analysis included Cardio-Vascular Disease (CVD) and Chronic Renal Failure (CRF).

The results showed that, nationwide, there were 3493 deaths between 2000 and 2004 where the person had a hospital record with a diagnosis of Type II diabetes but was recorded on their death certificate as dying from CVD or CRF, and did not have diabetes recorded as a contributory factor. For Counties Manukau the number of these deaths was 283.

Table 9: Number and Percentage of Cases where Underlying Cause of Death is CVD or CRF, by Diabetes Status According to Hospital Records and Mortality Records (National)

	Diabetes is Contributory Cause in Mortality Data					
	No		Yes		Total	
Diabetes Recorded in Hospital Records	N	%	N	%	N	%
Diabetes	3493	6.6%	3268	82.9%	6761	12.0%
No Diabetes Code	36251	69.0%	196	5.0%	36447	64.5%
No Hospital Record	12830	24.4%	476	12.1%	13306	23.5%

Table 10: Number and Percentage of Cases where Underlying Cause of Death is CVD or CRF, by Diabetes Status According to Hospital Records and Mortality Records (Counties Manukau)

	Diabetes Contributory Cause in Mortality Data					
	No		Yes		Total	
Diabetes Recorded in Hospital Records	N	%	N	%	N	%
Diabetes	283	7.5%	300	90.1%	583	14.2%
No Diabetes Code	2554	67.9%	3	.9%	2557	62.5%
No Hospital Record	924	24.6%	30	9.0%	954	23.3%

Table 11 shows the difference in the estimate of diabetes-related deaths when CVD and CRF deaths, with a hospital record with diabetes but no diabetes code in the mortality data, are added to the mortality statistics for those with diabetes recorded as a contributory factor on their death certificate. For CVD deaths, the diabetes-related cardiovascular disease deaths go up by 88.1% and for chronic renal failure the rate goes up by 122.2%. Similarly rates of under-reporting were found for all DHB areas, so a comparative analysis for Counties Manukau is not presented here.

Table 11: Estimates of Under-Reporting of Diabetes in Cases where CVD and CRF were the Underlying Cause of Death (National)

		Diabetes recorded in any hospital record				Diabetes-Related Deaths (as % of Deaths within Cause)		
		Diabetes	No Diabetes	No Hospital Record	Total	Mortality Collection	Mortality + NMDS	Difference (%)
Underlying Cause in Mortality Collection	Diabetes Coded in Mortality Collection	N	N	N	N			
CVD (I00-178)	No	3416	35533	12774	51723			
	Yes	3208	194	475	3877			
	Total	6624	35727	13249	55600	7.0% ($\frac{3877}{55600}$)	13.1% ($\frac{3877+3416}{55600}$)	88.1%
Chronic Renal Failure (N18)	No	77	718	56	851			
	Yes	60	2	1	63			
	Total	137	720	57	914	6.9% ($\frac{63}{914}$)	15.3% ($\frac{63+77}{914}$)	122.2%

3.5 Adding All CVD & CRF Deaths with a Diabetes Diagnosis in NMDS: Effect on Percentage of Diabetes-Related Deaths

Table 12 shows that by adding the deaths identified in the previous analysis, those who have an underlying cause of death of CVD or CRF and who have diabetes recorded in the hospital data but not in their mortality record, increases the overall estimates of diabetes-related deaths by 18.1-44.5% in the 21 DHB areas, and 33.6% nationwide. Figure 6 shows how the adjusted rates of diabetes-related deaths compared across the DHB areas. Northland, Counties Manukau and Lakes still had the highest rates, but Waikato, Tairāwhiti and Taranaki were now not far behind.

Table 12: The Effect of Adding CVD & CRF Deaths with a Diabetes Diagnosis in the NMDS to the Percentage of Diabetes-Related Deaths, by DHB

	Total Deaths	Diabetes-Related Deaths (MC)*		CVD or CRF + Hospital Record of Diabetes	Adjusted Diabetes-Related Deaths (N1+N2)	Difference
DHB Region	N	N1	% of Deaths (Raw)	N2	% of Deaths (Adjusted)	%
Northland	6007	581	9.7	144	12.1	24.4
Waitemata	12862	847	6.6	299	8.9	35.0
Auckland	12184	940	7.7	305	10.2	32.7
Counties Manukau	10652	1018	9.6	283	12.2	27.2
Waikato	11562	941	8.1	337	11.1	36.5
Lakes	3645	372	10.2	67	12.0	18.1
Bay of Plenty	7549	526	7.0	222	9.9	41.6
Tairāwhiti	1917	149	7.8	67	11.3	44.5
Hawke's Bay	6248	464	7.4	144	9.7	31.5
Taranaki	4502	394	8.8	118	11.4	29.2
Mid Central	6656	407	6.1	166	8.6	41.1
Whanganui	3022	241	8.0	70	10.3	28.6
Capital and Coast	7623	587	7.7	168	9.9	28.6
Hutt Valley	4665	335	7.2	96	9.2	28.3
Wairarapa	1727	123	7.1	35	9.1	28.9
Nelson Marlborough	5087	321	6.3	112	8.5	35.1
West Coast	1294	105	8.1	23	9.9	22.1
Canterbury	16709	1043	6.2	452	8.9	44.3
South Canterbury	2649	175	6.6	77	9.5	44.1
Otago	7472	539	7.2	196	9.8	36.6
Southern	4206	289	6.9	104	9.3	35.4
Unknown	722	31	4.3	8	5.4	25.6
Total	138960	10428	7.5	3493	10.0	33.6

*Diabetes as underlying or contributory cause.

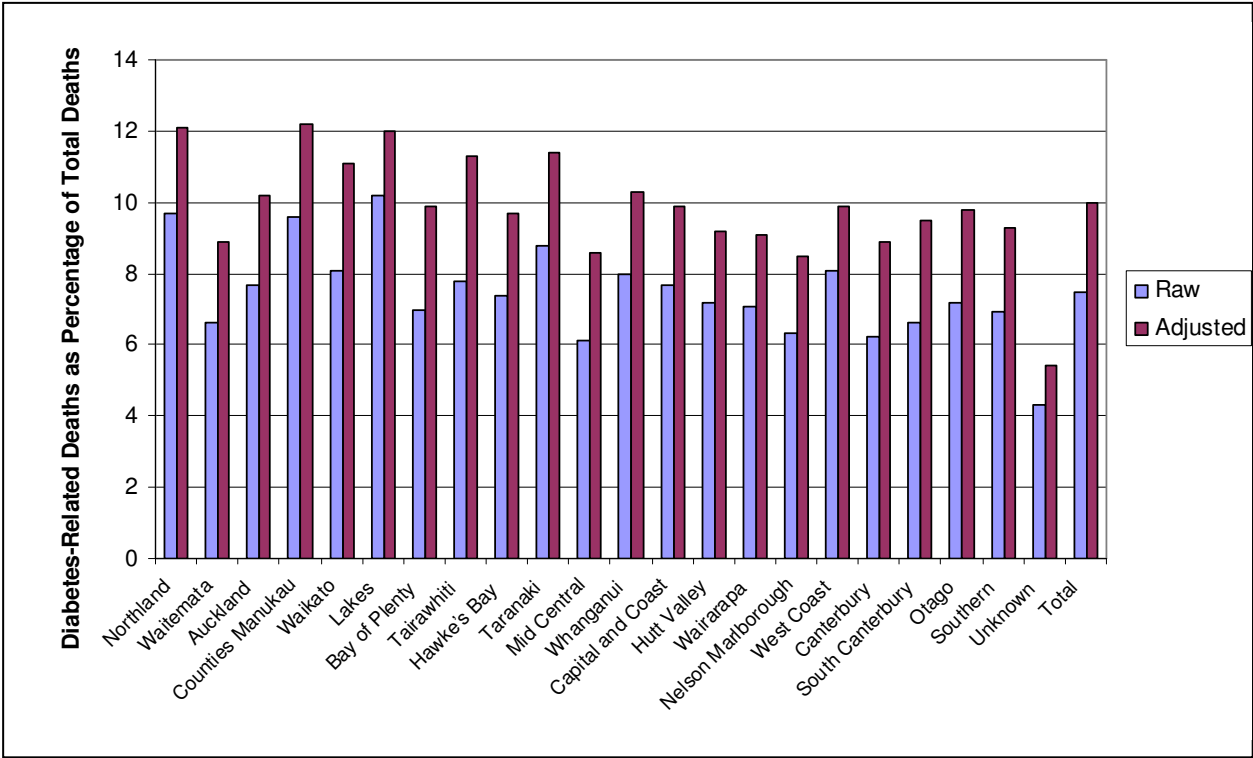


Figure 6: Raw and Adjusted Diabetes-Related Deaths as a Percentage of Total Deaths, by DHB

4 Discussion

4.1 Summary of Results

Northland, Counties Manukau and Lakes DHBs had the highest rates of diabetes-related deaths according to the mortality data. Interestingly, Counties Manukau had more diabetes-related deaths among females, as a proportion of the total number of deaths, than males. This is the reverse of the pattern seen in the national comparison group and other research. Counties Manukau also had consistently higher rates of diabetes-related deaths among Maori, Pacific, Asian and Other ethnic groups. The death rates for Maori, Pacific and Asian were two to three times greater than for European. Counties Manukau also had higher rates of diabetes-related deaths among 45-64 year olds than the national comparison group. Another concerning result showed that the rate of diabetes-related deaths is increasing in Counties Manukau at a greater rate than for the national comparison group. Overall it is clear that Counties Manukau has a greater burden of diabetes-related deaths than the national average, and this inequality is increasing particularly for already high-risk groups.

Linking of the mortality data with hospital records showed that over 85% of those with Type II diabetes recorded on their death certificate, also had a matching hospital record with diabetes recorded in their diagnostic information. The linkage also showed that approximately 7% of those who did not have Type II diabetes recorded on their death certificate, had a matching hospital record with diabetes. Further analysis revealed that many of these cases were for people who had died from CVD or CRF, where diabetes was likely to be a contributing factor. Adding these extra cases almost doubled the estimate of diabetes-related deaths in these two diagnostic groups. When the extra cases identified from the hospital data were used to adjust the overall rate of diabetes-related deaths, the overall rates increased between 18-45% in the different DHB areas and 34% nationally. Northland, Counties Manukau and Lakes DHBs were joined by Waikato, Tairāwhiti and Taranaki to be the areas with the highest rates of diabetes-related deaths.

4.2 Limitations

The current analysis has concentrated on working out the methodological issues around linking the mortality and hospital data. The death rates reported are raw percentages of the total number

of deaths and would, therefore, lack some validity for comparing rates across areas with different age distributions.

This study used mortality and hospital data from matching periods, January 2000 to December 2004. Using this method could have resulted in under-reporting of diabetes-related deaths in the earlier records in this data. For example, a person who died in January 2000 would be less likely to have a hospital record in a set of data that only dates back to the beginning of that month; but a person who died in December 2004 has a much greater chance of being matched because there are five years of data to use.

It is always difficult when working with databases that rely on accurate and consistent coding of information, as to whether any observed changes over time are real or just an artefact of changes in recording practices.

4.3 Future Research

Future analysis will use Census population figures to calculate diabetes-related death rates using a standardised mortality rate (SMR) or age standardised rate (ASR) method. This would allow more valid comparisons between geographical areas. It may also be more valid to replace the National comparison group with a National Excluding Counties Manukau group. This is especially important for comparisons of ethnic groups, where Counties Manukau has very large proportion of the total number of Pacific Island people. A further refinement of this study will endeavour to overcome the issue of having different linking probabilities based on the amount of data available prior to each person's death. This could involve matching data for a set period of time. For example, each death could be matched with hospital data spanning back one year from the date of death.

4.4 Conclusions

It is apparent from the results of this study that Counties Manukau and several other DHBs have a much greater, and increasing, burden of diabetes-related deaths. This burden is also not shared by all members of the population. Maori, Pacific and Asians are at higher risk, as are people in the 45-64 year age group.

This study has also demonstrated the effectiveness of using additional data to improve the accuracy of diabetes-related mortality statistics. The researchers believe that this would be a preferable method to the current reliance on mortality data on its own. Future research, which is

continuing from this study, will aim to improve this methodology and provide more detailed analysis of diabetes-related deaths.

5 References

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6 Appendices

6.1 Diabetes-Related Deaths from the Mortality Collection (Jan 2000-Dec 2004)

Northland District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	2493	91.0%	246	9.0%	2739	100.0%
	Male	2933	89.7%	335	10.3%	3268	100.0%
Prioritised Ethnicity	European	4085	93.4%	287	6.6%	4372	100.0%
	Maori	1287	81.9%	284	18.1%	1571	100.0%
	Pacific Island	28	77.8%	8	22.2%	36	100.0%
	Asian	16	88.9%	2	11.1%	18	100.0%
	Other	9	100.0%	0	.0%	9	100.0%
Age Group	<= 14	114	100.0%	0	.0%	114	100.0%
	15 - 24	89	100.0%	0	.0%	89	100.0%
	25 - 44	275	97.2%	8	2.8%	283	100.0%
	45 - 64	1003	88.1%	136	11.9%	1139	100.0%
	65+	3945	90.0%	437	10.0%	4382	100.0%

Waitemata District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	6073	93.5%	421	6.5%	6494	100.0%
	Male	5942	93.3%	426	6.7%	6368	100.0%
Prioritised Ethnicity	European	10624	94.3%	646	5.7%	11270	100.0%
	Maori	522	87.6%	74	12.4%	596	100.0%
	Pacific Island	461	84.4%	85	15.6%	546	100.0%
	Asian	332	90.2%	36	9.8%	368	100.0%
	Other	64	91.4%	6	8.6%	70	100.0%
Age Group	<= 14	243	100.0%	0	.0%	243	100.0%
	15 - 24	166	100.0%	0	.0%	166	100.0%
	25 - 44	585	98.2%	11	1.8%	596	100.0%
	45 - 64	1772	93.8%	117	6.2%	1889	100.0%
	65+	9249	92.8%	719	7.2%	9968	100.0%

Auckland District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	5900	92.9%	451	7.1%	6351	100.0%
	Male	5344	91.6%	489	8.4%	5833	100.0%

Prioritised Ethnicity	European	9161	94.0%	585	6.0%	9746	100.0%
	Maori	539	88.7%	69	11.3%	608	100.0%
	Pacific Island	909	82.8%	189	17.2%	1098	100.0%
	Asian	525	85.4%	90	14.6%	615	100.0%
	Other	99	93.4%	7	6.6%	106	100.0%
Age Group	<= 14	238	100.0%	0	.0%	238	100.0%
	15 - 24	152	100.0%	0	.0%	152	100.0%
	25 - 44	528	97.8%	12	2.2%	540	100.0%
	45 - 64	1560	91.8%	139	8.2%	1699	100.0%
	65+	8766	91.7%	789	8.3%	9555	100.0%

Waikato District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	5183	92.2%	439	7.8%	5622	100.0%
	Male	5438	91.5%	502	8.5%	5940	100.0%
Prioritised Ethnicity	European	8948	93.2%	650	6.8%	9598	100.0%
	Maori	1415	84.1%	267	15.9%	1682	100.0%
	Pacific Island	131	90.3%	14	9.7%	145	100.0%
	Asian	101	92.7%	8	7.3%	109	100.0%
	Other	14	93.3%	1	6.7%	15	100.0%
Age Group	<= 14	216	100.0%	0	.0%	216	100.0%
	15 - 24	182	100.0%	0	.0%	182	100.0%
	25 - 44	563	99.1%	5	.9%	568	100.0%
	45 - 64	1720	91.2%	165	8.8%	1885	100.0%
	65+	7940	91.1%	771	8.9%	8711	100.0%

Lakes District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	1573	90.0%	174	10.0%	1747	100.0%
	Male	1700	89.6%	198	10.4%	1898	100.0%
Prioritised Ethnicity	European	2458	92.5%	200	7.5%	2658	100.0%
	Maori	742	82.2%	161	17.8%	903	100.0%
	Pacific Island	45	84.9%	8	15.1%	53	100.0%
	Asian	24	88.9%	3	11.1%	27	100.0%
	Other	2	100.0%	0	.0%	2	100.0%
Age Group	<= 14	87	100.0%	0	.0%	87	100.0%
	15 - 24	74	100.0%	0	.0%	74	100.0%
	25 - 44	190	98.4%	3	1.6%	193	100.0%
	45 - 64	584	86.0%	95	14.0%	679	100.0%
	65+	2338	89.5%	274	10.5%	2612	100.0%

Bay of Plenty District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	3310	93.9%	215	6.1%	3525	100.0%
	Male	3713	92.3%	311	7.7%	4024	100.0%
Prioritised Ethnicity	European	5786	94.4%	341	5.6%	6127	100.0%
	Maori	1152	86.7%	177	13.3%	1329	100.0%
	Pacific Island	43	93.5%	3	6.5%	46	100.0%
	Asian	30	90.9%	3	9.1%	33	100.0%
	Other	3	60.0%	2	40.0%	5	100.0%
Age Group	<= 14	144	100.0%	0	.0%	144	100.0%
	15 - 24	111	100.0%	0	.0%	111	100.0%
	25 - 44	335	98.2%	6	1.8%	341	100.0%
	45 - 64	1024	92.4%	84	7.6%	1108	100.0%
	65+	5409	92.5%	436	7.5%	5845	100.0%

Tairawhiti District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	820	91.8%	73	8.2%	893	100.0%
	Male	948	92.6%	76	7.4%	1024	100.0%
Prioritised Ethnicity	European	1130	94.7%	63	5.3%	1193	100.0%
	Maori	619	87.8%	86	12.2%	705	100.0%
	Pacific Island	8	100.0%	0	.0%	8	100.0%
	Asian	8	100.0%	0	.0%	8	100.0%
	Other	1	100.0%	0	.0%	1	100.0%
Age Group	<= 14	38	100.0%	0	.0%	38	100.0%
	15 - 24	19	100.0%	0	.0%	19	100.0%
	25 - 44	114	98.3%	2	1.7%	116	100.0%
	45 - 64	320	90.7%	33	9.3%	353	100.0%
	65+	1277	91.8%	114	8.2%	1391	100.0%

Hawke's Bay District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	2954	93.2%	215	6.8%	3169	100.0%
	Male	2830	91.9%	249	8.1%	3079	100.0%
Prioritised Ethnicity	European	4825	93.7%	322	6.3%	5147	100.0%
	Maori	799	86.0%	130	14.0%	929	100.0%
	Pacific Island	50	86.2%	8	13.8%	58	100.0%
	Asian	34	91.9%	3	8.1%	37	100.0%

	Other	6	100.0%	0	.0%	6	100.0%
Age Group	<= 14	112	100.0%	0	.0%	112	100.0%
	15 - 24	85	100.0%	0	.0%	85	100.0%
	25 - 44	274	98.9%	3	1.1%	277	100.0%
	45 - 64	846	92.1%	73	7.9%	919	100.0%
	65+	4467	92.0%	388	8.0%	4855	100.0%

Taranaki District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	2089	91.5%	194	8.5%	2283	100.0%
	Male	2019	91.0%	200	9.0%	2219	100.0%
Prioritised Ethnicity	European	3732	91.9%	328	8.1%	4060	100.0%
	Maori	348	85.5%	59	14.5%	407	100.0%
	Pacific Island	6	66.7%	3	33.3%	9	100.0%
	Asian	15	78.9%	4	21.1%	19	100.0%
	Other	5	100.0%	0	.0%	5	100.0%
Age Group	<= 14	91	100.0%	0	.0%	91	100.0%
	15 - 24	42	100.0%	0	.0%	42	100.0%
	25 - 44	182	98.4%	3	1.6%	185	100.0%
	45 - 64	530	92.2%	45	7.8%	575	100.0%
	65+	3263	90.4%	346	9.6%	3609	100.0%

Mid Central District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	3101	93.9%	202	6.1%	3303	100.0%
	Male	3148	93.9%	205	6.1%	3353	100.0%
Prioritised Ethnicity	European	5634	94.6%	321	5.4%	5955	100.0%
	Maori	467	87.3%	68	12.7%	535	100.0%
	Pacific Island	40	75.5%	13	24.5%	53	100.0%
	Asian	44	89.8%	5	10.2%	49	100.0%
	Other	9	100.0%	0	.0%	9	100.0%
Age Group	<= 14	82	100.0%	0	.0%	82	100.0%
	15 - 24	87	100.0%	0	.0%	87	100.0%
	25 - 44	254	98.4%	4	1.6%	258	100.0%
	45 - 64	852	94.5%	50	5.5%	902	100.0%
	65+	4974	93.4%	353	6.6%	5327	100.0%

Whanganui District Health Board

		Diabetes is underlying/contributory cause					
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		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	1412	92.4%	116	7.6%	1528	100.0%
	Male	1369	91.6%	125	8.4%	1494	100.0%
Prioritised Ethnicity	European	2401	93.2%	174	6.8%	2575	100.0%
	Maori	352	84.8%	63	15.2%	415	100.0%
	Pacific Island	9	81.8%	2	18.2%	11	100.0%
	Asian	13	86.7%	2	13.3%	15	100.0%
	Other	4	100.0%	0	.0%	4	100.0%
Age Group	<= 14	59	100.0%	0	.0%	59	100.0%
	15 - 24	46	100.0%	0	.0%	46	100.0%
	25 - 44	111	98.2%	2	1.8%	113	100.0%
	45 - 64	394	90.2%	43	9.8%	437	100.0%
	65+	2171	91.7%	196	8.3%	2367	100.0%

Capital and Coast District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	3650	93.0%	274	7.0%	3924	100.0%
	Male	3386	91.5%	313	8.5%	3699	100.0%
Prioritised Ethnicity	European	6117	93.8%	403	6.2%	6520	100.0%
	Maori	369	86.0%	60	14.0%	429	100.0%
	Pacific Island	317	81.1%	74	18.9%	391	100.0%
	Asian	187	81.3%	43	18.7%	230	100.0%
	Other	44	86.3%	7	13.7%	51	100.0%
Age Group	<= 14	121	100.0%	0	.0%	121	100.0%
	15 - 24	111	100.0%	0	.0%	111	100.0%
	25 - 44	316	97.8%	7	2.2%	323	100.0%
	45 - 64	1017	90.0%	113	10.0%	1130	100.0%
	65+	5471	92.1%	467	7.9%	5938	100.0%

Hutt Valley District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	2236	93.4%	158	6.6%	2394	100.0%
	Male	2094	92.2%	177	7.8%	2271	100.0%
Prioritised Ethnicity	European	3760	94.1%	236	5.9%	3996	100.0%
	Maori	321	85.8%	53	14.2%	374	100.0%
	Pacific Island	144	82.8%	30	17.2%	174	100.0%
	Asian	94	86.2%	15	13.8%	109	100.0%
	Other	9	90.0%	1	10.0%	10	100.0%
Age Group	<= 14	76	100.0%	0	.0%	76	100.0%
	15 - 24	58	100.0%	0	.0%	58	100.0%

	25 - 44	208	99.0%	2	1.0%	210	100.0%
	45 - 64	700	92.3%	58	7.7%	758	100.0%
	65+	3288	92.3%	275	7.7%	3563	100.0%

Wairarapa District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	791	93.2%	58	6.8%	849	100.0%
	Male	813	92.6%	65	7.4%	878	100.0%
Prioritised Ethnicity	European	1476	93.7%	100	6.3%	1576	100.0%
	Maori	108	86.4%	17	13.6%	125	100.0%
	Pacific Island	10	66.7%	5	33.3%	15	100.0%
	Asian	8	88.9%	1	11.1%	9	100.0%
	Other	1	100.0%	0	.0%	1	100.0%
Age Group	<= 14	27	100.0%	0	.0%	27	100.0%
	15 - 24	22	100.0%	0	.0%	22	100.0%
	25 - 44	63	98.4%	1	1.6%	64	100.0%
	45 - 64	223	92.9%	17	7.1%	240	100.0%
	65+	1269	92.4%	105	7.6%	1374	100.0%

Nelson Marlborough District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	2349	92.9%	179	7.1%	2528	100.0%
	Male	2417	94.5%	142	5.5%	2559	100.0%
Prioritised Ethnicity	European	4590	93.9%	300	6.1%	4890	100.0%
	Maori	144	89.4%	17	10.6%	161	100.0%
	Pacific Island	7	100.0%	0	.0%	7	100.0%
	Asian	20	83.3%	4	16.7%	24	100.0%
	Other	3	100.0%	0	.0%	3	100.0%
Age Group	<= 14	70	100.0%	0	.0%	70	100.0%
	15 - 24	54	100.0%	0	.0%	54	100.0%
	25 - 44	183	100.0%	0	.0%	183	100.0%
	45 - 64	643	95.7%	29	4.3%	672	100.0%
	65+	3816	92.9%	292	7.1%	4108	100.0%

West Coast District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	521	91.1%	51	8.9%	572	100.0%

	Male	668	92.5%	54	7.5%	722	100.0%
Prioritised Ethnicity	European	1120	91.8%	100	8.2%	1220	100.0%
	Maori	64	92.8%	5	7.2%	69	100.0%
	Pacific Island	1	100.0%	0	.0%	1	100.0%
	Asian	1	100.0%	0	.0%	1	100.0%
	Other	2	100.0%	0	.0%	2	100.0%
Age Group	<= 14	17	100.0%	0	.0%	17	100.0%
	15 - 24	17	100.0%	0	.0%	17	100.0%
	25 - 44	63	98.4%	1	1.6%	64	100.0%
	45 - 64	197	96.6%	7	3.4%	204	100.0%
	65+	895	90.2%	97	9.8%	992	100.0%

Canterbury District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	7926	93.8%	521	6.2%	8447	100.0%
	Male	7740	93.7%	522	6.3%	8262	100.0%
Prioritised Ethnicity	European	14900	94.0%	950	6.0%	15850	100.0%
	Maori	420	87.0%	63	13.0%	483	100.0%
	Pacific Island	110	88.7%	14	11.3%	124	100.0%
	Asian	154	91.7%	14	8.3%	168	100.0%
	Other	27	100.0%	0	.0%	27	100.0%
Age Group	<= 14	194	100.0%	0	.0%	194	100.0%
	15 - 24	205	100.0%	0	.0%	205	100.0%
	25 - 44	600	98.7%	8	1.3%	608	100.0%
	45 - 64	2122	95.3%	104	4.7%	2226	100.0%
	65+	12545	93.1%	931	6.9%	13476	100.0%

South Canterbury District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	1251	93.8%	82	6.2%	1333	100.0%
	Male	1223	92.9%	93	7.1%	1316	100.0%
Prioritised Ethnicity	European	2423	93.6%	166	6.4%	2589	100.0%
	Maori	41	83.7%	8	16.3%	49	100.0%
	Pacific Island	2	66.7%	1	33.3%	3	100.0%
	Asian	5	100.0%	0	.0%	5	100.0%
	Other	1	100.0%	0	.0%	1	100.0%
Age Group	<= 14	35	100.0%	0	.0%	35	100.0%
	15 - 24	17	100.0%	0	.0%	17	100.0%
	25 - 44	70	100.0%	0	.0%	70	100.0%
	45 - 64	312	96.6%	11	3.4%	323	100.0%
	65+	2040	92.6%	164	7.4%	2204	100.0%

Otago District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	3621	93.1%	269	6.9%	3890	100.0%
	Male	3312	92.5%	270	7.5%	3582	100.0%
Prioritised Ethnicity	European	6702	93.0%	504	7.0%	7206	100.0%
	Maori	146	90.1%	16	9.9%	162	100.0%
	Pacific Island	24	75.0%	8	25.0%	32	100.0%
	Asian	46	82.1%	10	17.9%	56	100.0%
	Other	13	92.9%	1	7.1%	14	100.0%
Age Group	<= 14	75	100.0%	0	.0%	75	100.0%
	15 - 24	65	100.0%	0	.0%	65	100.0%
	25 - 44	219	99.5%	1	.5%	220	100.0%
	45 - 64	916	95.0%	48	5.0%	964	100.0%
	65+	5658	92.0%	490	8.0%	6148	100.0%

Southern District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	1934	93.0%	146	7.0%	2080	100.0%
	Male	1983	93.3%	143	6.7%	2126	100.0%
Prioritised Ethnicity	European	3681	93.4%	262	6.6%	3943	100.0%
	Maori	198	90.8%	20	9.2%	218	100.0%
	Pacific Island	21	77.8%	6	22.2%	27	100.0%
	Asian	13	100.0%	0	.0%	13	100.0%
	Other	2	100.0%	0	.0%	2	100.0%
Age Group	<= 14	60	100.0%	0	.0%	60	100.0%
	15 - 24	65	100.0%	0	.0%	65	100.0%
	25 - 44	148	99.3%	1	.7%	149	100.0%
	45 - 64	617	94.8%	34	5.2%	651	100.0%
	65+	3027	92.3%	254	7.7%	3281	100.0%

Unknown

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Gender	Female	238	94.4%	14	5.6%	252	100.0%
	Male	453	96.4%	17	3.6%	470	100.0%
Prioritised Ethnicity	European	420	97.4%	11	2.6%	431	100.0%
	Maori	8	100.0%	0	.0%	8	100.0%
	Pacific Island	132	91.0%	13	9.0%	145	100.0%

	Asian	121	96.0%	5	4.0%	126	100.0%
	Other	7	77.8%	2	22.2%	9	100.0%
Age Group	<= 14	30	100.0%	0	.0%	30	100.0%
	15 - 24	45	100.0%	0	.0%	45	100.0%
	25 - 44	101	100.0%	0	.0%	101	100.0%
	45 - 64	208	94.5%	12	5.5%	220	100.0%
	65+	307	94.2%	19	5.8%	326	100.0%

6.2 Diabetes-Related Deaths from the Mortality Collection by Year

Northland District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	997	91.6%	91	8.4%	1088	100.0%
	2001	1104	90.6%	115	9.4%	1219	100.0%
	2002	1167	90.4%	124	9.6%	1291	100.0%
	2003	1125	89.6%	130	10.4%	1255	100.0%
	2004	1033	89.5%	121	10.5%	1154	100.0%

Waitemata District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	2269	94.1%	142	5.9%	2411	100.0%
	2001	2461	93.8%	162	6.2%	2623	100.0%
	2002	2395	93.5%	166	6.5%	2561	100.0%
	2003	2458	93.0%	185	7.0%	2643	100.0%
	2004	2432	92.7%	192	7.3%	2624	100.0%

Auckland District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	2284	93.3%	165	6.7%	2449	100.0%
	2001	2228	92.8%	174	7.2%	2402	100.0%
	2002	2321	92.8%	179	7.2%	2500	100.0%
	2003	2162	91.0%	214	9.0%	2376	100.0%
	2004	2249	91.5%	208	8.5%	2457	100.0%

Waikato District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	2107	92.9%	161	7.1%	2268	100.0%
	2001	2178	92.6%	175	7.4%	2353	100.0%
	2002	2163	92.1%	186	7.9%	2349	100.0%
	2003	2046	90.5%	216	9.5%	2262	100.0%
	2004	2127	91.3%	203	8.7%	2330	100.0%

Lakes District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	642	89.4%	76	10.6%	718	100.0%
	2001	720	91.3%	69	8.7%	789	100.0%
	2002	615	89.7%	71	10.3%	686	100.0%
	2003	630	90.3%	68	9.7%	698	100.0%
	2004	666	88.3%	88	11.7%	754	100.0%

Bay of Plenty District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	1349	93.4%	96	6.6%	1445	100.0%
	2001	1433	93.1%	106	6.9%	1539	100.0%
	2002	1417	93.7%	95	6.3%	1512	100.0%
	2003	1399	93.0%	106	7.0%	1505	100.0%
	2004	1425	92.1%	123	7.9%	1548	100.0%

Tairāwhiti District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	348	91.8%	31	8.2%	379	100.0%
	2001	349	91.8%	31	8.2%	380	100.0%
	2002	374	92.6%	30	7.4%	404	100.0%
	2003	384	93.9%	25	6.1%	409	100.0%
	2004	313	90.7%	32	9.3%	345	100.0%

Hawke's Bay District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	1118	92.6%	89	7.4%	1207	100.0%
	2001	1153	92.5%	93	7.5%	1246	100.0%
	2002	1207	94.0%	77	6.0%	1284	100.0%
	2003	1210	91.9%	107	8.1%	1317	100.0%
	2004	1096	91.8%	98	8.2%	1194	100.0%

Taranaki District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	816	92.3%	68	7.7%	884	100.0%
	2001	812	90.5%	85	9.5%	897	100.0%
	2002	827	91.5%	77	8.5%	904	100.0%
	2003	827	91.5%	77	8.5%	904	100.0%
	2004	826	90.5%	87	9.5%	913	100.0%

Mid Central District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	1214	94.5%	71	5.5%	1285	100.0%
	2001	1303	94.6%	75	5.4%	1378	100.0%
	2002	1250	94.6%	72	5.4%	1322	100.0%
	2003	1221	92.8%	95	7.2%	1316	100.0%
	2004	1261	93.1%	94	6.9%	1355	100.0%

Whanganui District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	590	92.8%	46	7.2%	636	100.0%
	2001	560	91.7%	51	8.3%	611	100.0%
	2002	560	90.5%	59	9.5%	619	100.0%
	2003	559	93.2%	41	6.8%	600	100.0%
	2004	512	92.1%	44	7.9%	556	100.0%

Capital and Coast District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	1400	93.4%	99	6.6%	1499	100.0%
	2001	1396	92.6%	111	7.4%	1507	100.0%
	2002	1435	91.9%	127	8.1%	1562	100.0%
	2003	1430	92.6%	115	7.4%	1545	100.0%
	2004	1375	91.1%	135	8.9%	1510	100.0%

Hutt Valley District Health Board

		Diabetes is underlying/contributory cause					
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		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	833	92.8%	65	7.2%	898	100.0%
	2001	898	94.3%	54	5.7%	952	100.0%
	2002	857	92.5%	69	7.5%	926	100.0%
	2003	923	93.6%	63	6.4%	986	100.0%
	2004	819	90.7%	84	9.3%	903	100.0%

Wairarapa District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	328	95.6%	15	4.4%	343	100.0%
	2001	348	93.8%	23	6.2%	371	100.0%
	2002	307	92.5%	25	7.5%	332	100.0%
	2003	301	92.3%	25	7.7%	326	100.0%
	2004	320	90.1%	35	9.9%	355	100.0%

Nelson Marlborough District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	933	94.3%	56	5.7%	989	100.0%
	2001	949	93.6%	65	6.4%	1014	100.0%
	2002	983	92.5%	80	7.5%	1063	100.0%
	2003	909	93.6%	62	6.4%	971	100.0%
	2004	992	94.5%	58	5.5%	1050	100.0%

West Coast District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	204	93.2%	15	6.8%	219	100.0%
	2001	269	92.8%	21	7.2%	290	100.0%
	2002	241	90.3%	26	9.7%	267	100.0%
	2003	248	92.5%	20	7.5%	268	100.0%
	2004	227	90.8%	23	9.2%	250	100.0%

Canterbury District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%

Year of Death	2000	2951	93.8%	196	6.2%	3147	100.0%
	2001	3043	93.5%	210	6.5%	3253	100.0%
	2002	3256	93.8%	214	6.2%	3470	100.0%
	2003	3126	94.1%	196	5.9%	3322	100.0%
	2004	3290	93.5%	227	6.5%	3517	100.0%

South Canterbury District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	484	95.8%	21	4.2%	505	100.0%
	2001	516	93.5%	36	6.5%	552	100.0%
	2002	494	93.2%	36	6.8%	530	100.0%
	2003	482	91.8%	43	8.2%	525	100.0%
	2004	498	92.7%	39	7.3%	537	100.0%

Otago District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	1349	92.8%	105	7.2%	1454	100.0%
	2001	1423	93.7%	95	6.3%	1518	100.0%
	2002	1412	92.5%	114	7.5%	1526	100.0%
	2003	1431	92.9%	109	7.1%	1540	100.0%
	2004	1318	91.9%	116	8.1%	1434	100.0%

Southern District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	777	94.1%	49	5.9%	826	100.0%
	2001	800	92.6%	64	7.4%	864	100.0%
	2002	797	92.8%	62	7.2%	859	100.0%
	2003	782	92.5%	63	7.5%	845	100.0%
	2004	761	93.7%	51	6.3%	812	100.0%

Unknown

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Year of Death	2000	158	95.8%	7	4.2%	165	100.0%
	2001	132	95.7%	6	4.3%	138	100.0%

	2002	131	95.6%	6	4.4%	137	100.0%
	2003	132	94.3%	8	5.7%	140	100.0%
	2004	138	97.2%	4	2.8%	142	100.0%

6.3 Diabetes-Related Deaths through Linking with the NMDS

Northland District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	415	7.6%	502	86.4%	917	15.3%
	No Diabetes Code	3992	73.6%	25	4.3%	4017	66.9%
	No Hospital Record	1019	18.8%	54	9.3%	1073	17.9%

Waitemata District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	775	6.5%	720	85.0%	1495	11.6%
	No Diabetes Code	9173	76.3%	42	5.0%	9215	71.6%
	No Hospital Record	2067	17.2%	85	10.0%	2152	16.7%

Auckland District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	681	6.1%	810	86.2%	1491	12.2%
	No Diabetes Code	8127	72.3%	36	3.8%	8163	67.0%
	No Hospital Record	2436	21.7%	94	10.0%	2530	20.8%

Waikato District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	760	7.2%	831	88.3%	1591	13.8%
	No Diabetes Code	7650	72.0%	32	3.4%	7682	66.4%
	No Hospital Record	2211	20.8%	78	8.3%	2289	19.8%

Lakes District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	198	6.0%	314	84.4%	512	14.0%
	No Diabetes Code	2365	72.3%	24	6.5%	2389	65.5%
	No Hospital Record	710	21.7%	34	9.1%	744	20.4%

Bay of Plenty District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	537	7.6%	462	87.8%	999	13.2%
	No Diabetes Code	5162	73.5%	13	2.5%	5175	68.6%
	No Hospital Record	1324	18.9%	51	9.7%	1375	18.2%

Tairāwhiti District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	161	9.1%	124	83.2%	285	14.9%
	No Diabetes Code	1227	69.4%	1	.7%	1228	64.1%
	No Hospital Record	380	21.5%	24	16.1%	404	21.1%

Hawke's Bay District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	337	5.8%	380	81.9%	717	11.5%
	No Diabetes Code	4262	73.7%	22	4.7%	4284	68.6%
	No Hospital Record	1185	20.5%	62	13.4%	1247	20.0%

Taranaki District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	254	6.2%	302	76.6%	556	12.4%
	No Diabetes Code	3079	75.0%	48	12.2%	3127	69.5%
	No Hospital Record	775	18.9%	44	11.2%	819	18.2%

Mid Central District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	407	6.5%	337	82.8%	744	11.2%
	No Diabetes Code	4596	73.5%	20	4.9%	4616	69.4%
	No Hospital Record	1246	19.9%	50	12.3%	1296	19.5%

Whanganui District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	172	6.2%	202	83.8%	374	12.4%
	No Diabetes Code	2083	74.9%	11	4.6%	2094	69.3%
	No Hospital Record	526	18.9%	28	11.6%	554	18.3%

Capital and Coast District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	387	5.5%	482	82.1%	869	11.4%
	No Diabetes Code	5141	73.1%	43	7.3%	5184	68.0%
	No Hospital Record	1508	21.4%	62	10.6%	1570	20.6%

Hutt Valley District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	255	5.9%	280	83.6%	535	11.5%
	No Diabetes Code	3293	76.1%	18	5.4%	3311	71.0%
	No Hospital Record	782	18.1%	37	11.0%	819	17.6%

Wairarapa District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	99	6.2%	115	93.5%	214	12.4%
	No Diabetes Code	1178	73.4%	3	2.4%	1181	68.4%
	No Hospital Record	327	20.4%	5	4.1%	332	19.2%

Nelson Marlborough District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	256	5.4%	262	81.6%	518	10.2%
	No Diabetes Code	3606	75.7%	24	7.5%	3630	71.4%
	No Hospital Record	904	19.0%	35	10.9%	939	18.5%

West Coast District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	78	6.6%	86	81.9%	164	12.7%
	No Diabetes Code	885	74.4%	10	9.5%	895	69.2%
	No Hospital Record	226	19.0%	9	8.6%	235	18.2%

Canterbury District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	1079	6.9%	862	82.6%	1941	11.6%
	No Diabetes Code	11738	74.9%	61	5.8%	11799	70.6%
	No Hospital Record	2849	18.2%	120	11.5%	2969	17.8%

South Canterbury District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	203	8.2%	152	86.9%	355	13.4%
	No Diabetes Code	1869	75.5%	5	2.9%	1874	70.7%
	No Hospital Record	402	16.2%	18	10.3%	420	15.9%

Otago District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	449	6.5%	477	88.5%	926	12.4%
	No Diabetes Code	5302	76.5%	24	4.5%	5326	71.3%
	No Hospital Record	1182	17.0%	38	7.1%	1220	16.3%

Southern District Health Board

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	230	5.9%	250	86.5%	480	11.4%
	No Diabetes Code	2887	73.7%	10	3.5%	2897	68.9%
	No Hospital Record	800	20.4%	29	10.0%	829	19.7%

Unknown

		Diabetes is underlying/contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	24	3.5%	21	67.7%	45	6.2%
	No Diabetes Code	215	31.1%	0	.0%	215	29.8%
	No Hospital Record	452	65.4%	10	32.3%	462	64.0%

6.4 Diabetes Coding Where CVD & CRF are Underlying Cause of Death

Northland District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	144	7.0%	158	80.6%	302	13.4%
	No Diabetes Code	1431	69.4%	10	5.1%	1441	63.8%
	No Hospital Record	486	23.6%	28	14.3%	514	22.8%

Waitemata District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	299	6.4%	286	83.4%	585	11.7%
	No Diabetes Code	3362	72.4%	18	5.2%	3380	67.8%
	No Hospital Record	983	21.2%	39	11.4%	1022	20.5%

Auckland District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	305	6.5%	295	84.0%	600	11.9%
	No Diabetes Code	3145	67.2%	15	4.3%	3160	62.8%
	No Hospital Record	1228	26.3%	41	11.7%	1269	25.2%

Waikato District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	337	7.7%	297	86.1%	634	13.4%
	No Diabetes Code	2928	66.7%	10	2.9%	2938	62.0%
	No Hospital Record	1127	25.7%	38	11.0%	1165	24.6%

Lakes District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	67	5.6%	91	82.7%	158	12.2%
	No Diabetes Code	810	68.1%	8	7.3%	818	62.9%
	No Hospital Record	313	26.3%	11	10.0%	324	24.9%

Bay of Plenty District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	222	7.7%	157	86.3%	379	12.4%
	No Diabetes Code	1999	69.5%	5	2.7%	2004	65.5%
	No Hospital Record	656	22.8%	20	11.0%	676	22.1%

Tairāwhiti District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	67	9.0%	36	81.8%	103	13.1%
	No Diabetes Code	480	64.8%	0	.0%	480	61.1%
	No Hospital Record	194	26.2%	8	18.2%	202	25.7%

Hawke's Bay District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	144	6.0%	159	81.5%	303	11.6%
	No Diabetes Code	1635	67.8%	10	5.1%	1645	63.1%
	No Hospital Record	632	26.2%	26	13.3%	658	25.2%

Taranaki District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	118	6.5%	119	72.6%	237	12.0%
	No Diabetes Code	1259	69.7%	26	15.9%	1285	65.2%
	No Hospital Record	430	23.8%	19	11.6%	449	22.8%

Mid Central District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	166	6.1%	137	77.4%	303	10.5%
	No Diabetes Code	1858	68.6%	9	5.1%	1867	64.7%
	No Hospital Record	685	25.3%	31	17.5%	716	24.8%

Whanganui District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	70	6.0%	66	79.5%	136	10.8%
	No Diabetes Code	826	70.4%	2	2.4%	828	65.9%
	No Hospital Record	277	23.6%	15	18.1%	292	23.2%

Capital and Coast District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	168	5.8%	176	80.0%	344	11.1%
	No Diabetes Code	1941	67.3%	19	8.6%	1960	63.1%
	No Hospital Record	777	26.9%	25	11.4%	802	25.8%

Hutt Valley District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	96	5.8%	108	83.1%	204	11.4%
	No Diabetes Code	1193	71.6%	10	7.7%	1203	67.0%
	No Hospital Record	377	22.6%	12	9.2%	389	21.7%

Wairarapa District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	35	5.7%	37	92.5%	72	10.9%
	No Diabetes Code	422	68.2%	0	.0%	422	64.0%
	No Hospital Record	162	26.2%	3	7.5%	165	25.0%

Nelson Marlborough District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	112	5.6%	111	79.9%	223	10.5%
	No Diabetes Code	1417	71.3%	11	7.9%	1428	67.1%
	No Hospital Record	459	23.1%	17	12.2%	476	22.4%

West Coast District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	23	4.9%	30	78.9%	53	10.4%
	No Diabetes Code	331	70.3%	3	7.9%	334	65.6%
	No Hospital Record	117	24.8%	5	13.2%	122	24.0%

Canterbury District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	452	6.9%	365	80.0%	817	11.6%
	No Diabetes Code	4675	71.0%	24	5.3%	4699	66.7%
	No Hospital Record	1462	22.2%	67	14.7%	1529	21.7%

South Canterbury District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	77	7.8%	56	88.9%	133	12.7%
	No Diabetes Code	698	70.9%	2	3.2%	700	66.8%
	No Hospital Record	210	21.3%	5	7.9%	215	20.5%

Otago District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	196	6.6%	184	88.0%	380	12.0%
	No Diabetes Code	2090	70.6%	8	3.8%	2098	66.2%
	No Hospital Record	676	22.8%	17	8.1%	693	21.9%

Southern District Health Board

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	104	6.3%	92	83.6%	196	11.1%
	No Diabetes Code	1119	67.3%	3	2.7%	1122	63.3%
	No Hospital Record	440	26.5%	15	13.6%	455	25.7%

Unknown

		Diabetes is contributory cause					
		No		Yes		Total	
		N	%	N	%	N	%
Diabetes Recorded in Hospital Records	Diabetes	8	2.7%	8	66.7%	16	5.1%
	No Diabetes Code	78	25.9%	0	.0%	78	24.9%
	No Hospital Record	215	71.4%	4	33.3%	219	70.0%

6.5 Estimating the Magnitude of the Under-reporting of Deaths for CVD & CRF where Type II Diabetes is a Possible Contributing Factor

All

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	3416	35533	12774	51723
			Yes	3208	194	475	3877
			Total	6624	35727	13249	55600
	Chronic renal failure	Diabetes is underlying/contributory cause	No	77	718	56	851
			Yes	60	2	1	63
			Total	137	720	57	914

Northland District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	142	1399	484	2025
			Yes	154	10	27	191
			Total	296	1409	511	2216
	Chronic renal failure	Diabetes is underlying/contributory cause	No	2	32	2	36
			Yes	4	0	1	5
			Total	6	32	3	41

Waitemata District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	290	3294	980	4564
			Yes	283	17	39	339
			Total	573	3311	1019	4903
	Chronic renal failure	Diabetes is underlying/contributory cause	No	9	68	3	80
			Yes	3	1	0	4
			Total	12	69	3	84

Auckland District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	299	3072	1226	4597
			Yes	287	15	41	343
			Total	586	3087	1267	4940
	Chronic renal failure	Diabetes is underlying/contributory cause	No	6	73	2	81
			Yes	8	0	0	8
			Total	14	73	2	89

Counties Manukau District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	279	2501	920	3700
			Yes	296	3	30	329
			Total	575	2504	950	4029
	Chronic renal failure	Diabetes is underlying/contributory cause	No	4	53	4	61
			Yes	4	0	0	4
			Total	8	53	4	65

Waikato District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	328	2879	1123	4330
			Yes	290	10	38	338
			Total	618	2889	1161	4668
	Chronic renal failure	Diabetes is underlying/contributory cause	No	9	49	4	62
			Yes	7	0	0	7
			Total	16	49	4	69

Lakes District Health Board

				Diabetes Recorded in Hospital Records			
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				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	65	793	312	1170
			Yes	91	8	11	110
			Total	156	801	323	1280
	Chronic renal failure	Diabetes is underlying/contributory cause	No	2	17	1	20
			Yes	0	0	0	0
			Total	2	17	1	20

Bay of Plenty District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	217	1952	655	2824
			Yes	156	5	20	181
			Total	373	1957	675	3005
	Chronic renal failure	Diabetes is underlying/contributory cause	No	5	47	1	53
			Yes	1	0	0	1
			Total	6	47	1	54

Tairāwhiti District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	64	474	194	732
			Yes	36	0	8	44
			Total	100	474	202	776
	Chronic renal failure	Diabetes is underlying/contributory cause	No	3	6	0	9
			Yes	0	0	0	0
			Total	3	6	0	9

Hawke's Bay District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N

Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	141	1607	627	2375
			Yes	156	9	26	191
			Total	297	1616	653	2566
	Chronic renal failure	Diabetes is underlying/contributory cause	No	3	28	5	36
			Yes	3	1	0	4
			Total	6	29	5	40

Taranaki District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	115	1229	428	1772
			Yes	113	26	19	158
			Total	228	1255	447	1930
	Chronic renal failure	Diabetes is underlying/contributory cause	No	3	30	2	35
			Yes	6	0	0	6
			Total	9	30	2	41

Mid Central District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	165	1814	682	2661
			Yes	134	9	31	174
			Total	299	1823	713	2835
	Chronic renal failure	Diabetes is underlying/contributory cause	No	1	44	3	48
			Yes	3	0	0	3
			Total	4	44	3	51

Whanganui District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	70	814	271	1155
			Yes	66	2	15	83
			Total	136	816	286	1238
	Chronic	Diabetes is	No	0	12	6	18

	renal failure	underlying/contributory cause	Yes	0	0	0	0
			Total	0	12	6	18

Capital and Coast District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	166	1907	773	2846
			Yes	176	19	25	220
			Total	342	1926	798	3066
	Chronic renal failure	Diabetes is underlying/contributory cause	No	2	34	4	40
			Yes	0	0	0	0
			Total	2	34	4	40

Hutt Valley District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	90	1168	375	1633
			Yes	106	10	12	128
			Total	196	1178	387	1761
	Chronic renal failure	Diabetes is underlying/contributory cause	No	6	25	2	33
			Yes	2	0	0	2
			Total	8	25	2	35

Wairarapa District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	35	410	161	606
			Yes	37	0	3	40
			Total	72	410	164	646
	Chronic renal failure	Diabetes is underlying/contributory cause	No	0	12	1	13
			Yes	0	0	0	0
			Total	0	12	1	13

Nelson Marlborough District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	108	1402	456	1966
			Yes	108	11	17	136
			Total	216	1413	473	2102
	Chronic renal failure	Diabetes is underlying/contributory cause	No	4	15	3	22
			Yes	3	0	0	3
			Total	7	15	3	25

West Coast District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	22	321	117	460
			Yes	29	3	5	37
			Total	51	324	122	497
	Chronic renal failure	Diabetes is underlying/contributory cause	No	1	10	0	11
			Yes	1	0	0	1
			Total	2	10	0	12

Canterbury District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	445	4608	1455	6508
			Yes	358	24	67	449
			Total	803	4632	1522	6957
	Chronic renal failure	Diabetes is underlying/contributory cause	No	7	67	7	81
			Yes	7	0	0	7
			Total	14	67	7	88

South Canterbury District Health Board

				Diabetes Recorded in Hospital Records			
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				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	74	685	210	969
			Yes	55	2	5	62
			Total	129	687	215	1031
	Chronic renal failure	Diabetes is underlying/contributory cause	No	3	13	0	16
			Yes	1	0	0	1
			Total	4	13	0	17

Otago District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	192	2034	671	2897
			Yes	179	8	17	204
			Total	371	2042	688	3101
	Chronic renal failure	Diabetes is underlying/contributory cause	No	4	56	5	65
			Yes	5	0	0	5
			Total	9	56	5	70

Southern District Health Board

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N
Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	101	1093	440	1634
			Yes	90	3	15	108
			Total	191	1096	455	1742
	Chronic renal failure	Diabetes is underlying/contributory cause	No	3	26	0	29
			Yes	2	0	0	2
			Total	5	26	0	31

Unknown

				Diabetes Recorded in Hospital Records			
				Diabetes	No Diabetes Code	No Hospital Record	Total
				N	N	N	N

Underlying Cause	All CVD (I00-178)	Diabetes is underlying/contributory cause	No	8	77	214	299
			Yes	8	0	4	12
			Total	16	77	218	311
	Chronic renal failure	Diabetes is underlying/contributory cause	No	0	1	1	2
			Yes	0	0	0	0
			Total	0	1	1	2