

9 DIABETES MELLITUS

KEY FINDINGS - WAIKATO

- The number of diabetes patients in Waikato has been increasing at a rapid pace in the recent years, around 7-10% per year. The Asian diabetes patients in Waikato have outnumbered Pacific People.
- Prevalence rates of diabetes vary widely across subgroups of age and ethnicity.
- Type 2 diabetes (non insulin dependent) is becoming a more significant health issue among young people under the age of 25, especially Maori.
- The incidence of hospitalisation for insulin dependent diabetes increased in Maori females.
- Hospitalisation for insulin dependent diabetes was the highest in deprivation quintile 5, fluctuating between 50% and 77% and similar trend was seen for non-insulin dependent hospitalisation at 56% among quintile 5 for 2006 year.
- Age proportions of hospitalisation for insulin dependent diabetes was highest among 25-44 age groups in most years.
- For Waikato Maori, hospital admission for Type 1 diabetes (insulin dependent) was highest among children and young people (aged 00-14 and 15-24 years). This is also shown for Other and Asian ethnic groups.
- Maori patients with diabetes were 9 times more likely to have an admission for renal disease than European with diabetes.
- However among Maori with diabetes, the risk of admissions was similar to European for coronary artery disease or cardiovascular disease.
- Maori were diagnosed with Type 2 diabetes at a mean age of 48 years, Indians at 49 years and Pacific People at 50 years compared with Europeans at 59 years.
- Hospitalisation for diabetes was highest in NZDeprivation quintile 5 for Maori and Pacific People, however it spreads across quintile 3 to 5 for Other and Asian ethnic groups.
- Waikato Maori age standardised rate of hospitalisation among 45-64 year olds was five times higher, and among 65+ age groups was four times higher than the Other ethnic group.
- Among Waikato Pacific People the rate among 65+ age groups was eight times higher than Other ethnic group, however this may be attributable to the low volume of Pacific People.

RECOMMENDATIONS FOR STRATEGIC CONSIDERATION

The recommendations are as follows:

Future Data Analysis for Diabetes: The hospitalisation record in NZHIS (New Zealand Health Information Services) databases holds many diagnosis codes, however for population based health needs analysis of all hospitalisation, only the

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primary diagnosis code is considered the reason for admission. This prevents double counting of hospitalisation, but is one of the critical limitations of hospitalisation analysis. The Waikato Regional Diabetes Services (WRDS) database holds information around 90% of diabetes patients in the region. Hence, for diabetes analysis in the Waikato area, it is possible to overcome the limitations with the NZHIS data by employing a cohort analysis approach. This entails establishing a comprehensive database of patients with a condition and then analysing the admission rates, length of stay, mortality etc for this group of patients.

The national database provides a valuable and reasonably reliable proxy for measuring the health outcomes of the population. It is recommended that any future analysis for diabetes service planning and monitoring in the Waikato region should include a combined analysis of both NZHIS and WRDS data in order to gain a wider perspective on the prevalence of diabetes in the Waikato area and to understand the magnitude of the burden on health services due to diabetes complications.

Dynamic Link to PHOs: WRDS is an excellent tool for monitoring prevalence of diabetes in the Waikato area. It is recommended that a dynamic link be established with GP databases, eg. Get Checked. This link will set the foundation for “end to end” monitoring and provision of chronic care management by relevant e health professionals in the continuum of care. For example when patients come for retinal screening, then an appointment could be scheduled in the GP database for “Get Checked” programme. In addition to the link, options for web enabled technology should be explored where appropriate.

Midland Regional Diabetes Management Programmes: The age standardised rate of mortality in the Lakes and Tairāwhiti area were the highest in the Midland region in 2003-2004. Any diabetes management programmes at the Midland region level need to consider the additional services required in the Lakes and Tairāwhiti areas.

Retention of Patients and Health Inequalities: Further investigations are required to address the retention of patients in current and future programmes and also the inequalities in health outcomes:

- The high risk of renal disease admission for Maori patients and the increasing risk of vision threatening retinopathy for non European patients.
- The progression to coronary artery disease among Maori and European diabetes patients.
- Mechanisms to reduce the barriers to diabetes care outlined in Section 9.24 below.

Young People with Type 1 Diabetes: The Ministry of Health recognises the increase in Type 1 diabetes among young people in New Zealand. Paediatric working party identified increase in Type 1 diabetes among 15-24 year olds, which is consistent with the findings outlined below. It is recommended that the Waikato DHB commit to a dedicated team of health specialists to address the needs of Waikato youth population with Type 1 diabetes.

Recommendations from Auditor General's Report:

Some of the recommendations from the Auditor General report for consideration are for the Waikato DHB to:

- Establish a local diabetes register. Waikato DHB has a regional database (WRDS) to register the diabetes patients, however, the database is standalone and appropriate telecommunication links need to be established to maximize its full potential.
- Carry out audits to ensure that general practices are preparing good quality treatment plans, in line with the relevant guidelines, and are giving the necessary support to patients so they can implement the plans.
- Work with Local Diabetes Teams to collect data on specialist diabetes services and carry out supply and demand analysis to assess the adequacy of the services.
- Carry out more cohort studies, using repeated measurement of people who have participated in the programme over several years, to identify how effective the programme is and how best to improve diabetes management
- These recommendations assume that the Waikato DHB will continue to address the risk factors with programmes to encourage physical activity and healthy eating that set the foundation for reducing chronic illnesses.

9.1 Introduction

Diabetes mellitus, commonly referred to as diabetes, is a medical condition associated with abnormally high levels of glucose (or sugar) in the blood (hyperglycaemia). Diabetes is a multi-system disorder and remains one of the largest public health challenges. With the whole spectrum of diabetes complications, such as cardiovascular diseases (CVD), coronary artery diseases (CAD), stroke, retinopathy and amputations, the effective management and control of diabetes requires a wide spectrum of health services interacting closely in a timely manner to achieve optimal outcomes.

There are three types of diabetes⁶² :

1. Type 1 Diabetes - Insulin Dependent Diabetes

This occurs when pancreas is unable to produce sufficient insulin for the body's needs. It is an auto immune disorder and not related to lifestyle conditions. The onset of this condition predominantly affects children or teenagers but it can appear at any age. It can be managed through lifelong insulin therapy.

2. Type 2 diabetes - Non Insulin Dependent Diabetes

This occurs when the body is unable to use the insulin produced by the pancreas. This is a life style condition and in many cases can be prevented.

⁶² Diabetes Fact Sheet 2006, Diabetes New Zealand, www.diabetes.org.nz

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It can exist for many years before any symptoms occur. People who are more at risk of this condition are those who are over 40 years and overweight or inactive (especially Maori, Pacific Island or Asian people). This condition can be well managed with diet and oral medications.

3. Gestational diabetes

This occurs in some pregnant women, and usually blood glucose levels return to normal following the birth of the baby. Women with gestational diabetes are more likely to develop Type 2 diabetes later in life.

Laboratory Tests

There are a large number of tests to understand the stages of diabetes and these tests help the clinician and patient to plan the necessary life style changes for the effective management of diabetes. One of the tests, HbA1c level measures a person's average blood glucose over the preceding 4 - 6 weeks and by monitoring the HbA1c levels down into the optimal ranges enables the clinicians or the diabetes nurse to implement a range of diet, weight control and lifestyle measures as well as learning to use medications that help to control the way a diabetes patient's body uses glucose. Regular self-monitoring of blood glucose - using a finger-prick device, test strip and monitor - also helps control the blood glucose level.

9.2 Background

In New Zealand and in Waikato, diabetes is one of the top five leading causes of death and hospitalisation, disproportionately affecting Māori, Indians and Pacific people and people of low socio economic status. Late diagnosis and/or poor management of diabetes increase the costs to the health system exponentially as it leads to other chronic illnesses and complications.

While mortality and morbidity to diabetes continue to escalate at an alarming pace in the last seven years, growing number of Government and DHB funded initiatives are in place to prevent diabetes and its complications. In addition, a few DHBs have either implemented or are in the process of implementing a diabetes register. Waikato DHB has implemented the Waikato Regional Diabetes Services (WRDS) database, which is a standalone database. In the immediate future, connectivity between Primary Health Organisations (PHOs) databases and WRDS is critical, as it will provide a sound platform for effective monitoring and control of the prevalence and incidence of diabetes and its complications.

Reducing the incidence and impact of diabetes is one of the Health Priorities in the Waikato Strategic Plan 2006-2015 and one of the thirteen priority health objectives in the NZ Health Strategy. Diabetes is also one of the priority areas for Maori health strategy.

In order to implement an effective early detection and disease management framework, the Health Funding Authority (HFA) launched the Get Checked Programme in June 2000. In addition the Ministry of Health's "The Healthy Eating Healthy Action (HEHA)" strategy has become an integral part of DHB strategy

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across the country that targets the prevention of some chronic diseases such as cardio vascular diseases and diabetes.

9.3 Cost of Diabetes to Health Sector

PricewaterhouseCoopers Ltd estimated that the Type 2 diabetes cost in 2001 approached NZ\$400 million and was predicted to rise to more than NZ\$1,000 million by 2021⁶³. They also estimated that the total cost of diabetes could be reduced over 20 years if existing services are increased as soon as possible (by \$10 million each year in their enhanced services model).

9.4 Data Sources and Limitations

The following two data sources were used in the HNA 2008 analysis, in addition to information from a number of publications:

New Zealand Health Information Services (NZHIS) databases for mortality and morbidity

Waikato Regional Diabetes Services (WRDS) database.

In order to comprehend the full potential of this combined analysis, it is necessary to understand the data limitations with NZHIS and how the combined analysis with data from the WRDS database compliment the outcome of the HNA analysis.

Even with this combined data analysis, there are some limitations due to the insufficient and/or lack of information sharing across the primary, secondary and tertiary health sectors.

9.4.1 NZHIS Data Limitations - Mortality and Morbidity

NZHIS Morbidity Data Limitations

For the Health Needs Assessment and Analysis (HNA) 2008, the mortality and morbidity data were extracted from the national “New Zealand Health Information System” (NZHIS) databases. The limitations with the national data sources are explained in detail in the Data Sources and Limitations, chapter of the HNA 2008.

Hospital admissions for diabetes (ICD10 codes E10-E14) are routinely analysed to assess the morbidity levels among diabetes patients and their service utilisation. The hospitalisation records in the NZHIS holds many diagnosis codes however only the primary diagnosis code is considered the reason for admission and this is one of the critical limitations of hospitalisation analysis. Often patients are admitted for diabetes related complications such as Cardiovascular disease (CVD), Coronary artery diseases (CAD), renal failure and amputations. An

⁶³ Type 2 Diabetes: Managing for Better Health Outcomes, PricewaterhouseCoopers Economic Report for Diabetes New Zealand Inc;2001. URL: <http://www.diabetes.org.nz/resources/pwcreport.html>

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analysis involving only primary diagnosis codes does not report many of the admissions for diabetes related complications as hospitalisation for diabetes.

This results in:

Under Ascertainment of Admissions

Diabetes admissions present as infections, heart attacks, strokes etc and rarely are directly attributable to diabetes. On all audits to date of discharge coding, diabetes which is known to the attending medical teams is not entered or coded in the discharge process in about 50% of cases. This has not changed over the last decade. If diabetes is not entered as either the principal or secondary diagnosis then it will not be recorded in the NZHIS dataset.

Under Ascertainment of Mortality

Diabetes mortality figures again are under represented on NZHIS datasets as people with diabetes die from cardiovascular diseases and similar and very rarely from diabetes.

Inability to Determine Morbidity

The hospitalisation records in the NZHIS holds many diagnosis codes however only the primary diagnosis code is considered the reason for admission and this is one of the critical limitations of hospitalisation analysis. Often patients are admitted for diabetes related complications such as CVD, CAD, renal failure and amputations. An analysis involving only primary diagnosis codes does not report many of the admissions for diabetes related complications as hospitalisation for diabetes.

Inability to Compare Regions

DHB's across the nation adhere to varying business rules for coding hospital admissions and discharges. This results in incompatibility of information, thereby reducing potential benefits from collaborative services.

NZHIS Mortality Data Limitations

NZHIS mortality records are routinely analysed, looking at deaths due to diabetes. In contrast to infectious diseases or cancer, diabetes patients develop several complications as the disease progresses. Many diabetes patients die from coronary artery disease and renal complications. There are issues around coding of diabetes on death certificates when diabetes patients die of complications. Difficulties in the coding of diabetes have been recognised for many years⁶⁴ yet continue to be rediscovered⁶⁵ ⁶⁶ with 45%–55% under-coding

⁶⁴ Coppel K, McBride K, Williams S. Under-reporting of diabetes on death certificates among a population with diabetes in Otago Province, New Zealand. N Z Med J. 2004;117(1207). URL: <http://www.nzma.org.nz/journal/117-1207/1217>

⁶⁵ Chen F, Florkowski CM, Dever M, Beaven DW. Death certification in New Zealand Health Information Service (NZHIS) statistics for diabetes mellitus: an under-recognised health problem. Diabetes Res Clinical Practice. 2004;63:113–8

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especially among non-insulin using (Type 2) patients. Thus mortality records from NZHIS are hugely under estimating deaths among diabetes patients.

Any health needs analysis based on the NZHIS datasets alone may not provide a precise health status of the population, however, the national datasets still provide a valuable and reasonably reliable proxy for measuring the health outcomes of the population at a national, regional and individual DHB levels. By incorporating data from other information systems based within a DHB, such as the WRDS, it is possible to build a more accurate, and more complete, picture of the health status of the population.

9.5 Waikato Regional Diabetes Services (WRDS) Database

Waikato DHB has established a comprehensive database called the “Waikato Regional Diabetes Service (WRDS)” to record details of patients with diabetes in the Waikato DHB area. This database holds the NHI numbers and basic details of over 90% of diabetes patients in the Midland region. The database is nearly complete for Type 1 diabetes patients and slightly under represents the very elderly Type 2 diabetes patients. The WRDS provides secondary diabetes care

⁶⁶ Information Service (NZHIS) statistics for diabetes mellitus: an under-recognised health problem. *Diabetes Res Clinical Practice*. 2004;63:113–8

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and performs retinal screening in the Waikato DHB region hence the register is thought to be near complete for Waikato⁶⁷.

Key advantages of cohort analysis using WRDS are:

- It overcomes the problem of under coding of diabetes on mortality records; and
- It is able to capture all hospital admissions, including those related to diabetes complications.

In the following sections, marked differences are shown between from the WRDS cohort analysis and the NZHIS analysis.

9.6 Registration of Diabetes in WRDS - 2003-2005

The information presented below is extracted from the report “Status of Diabetes and its Complications in Waikato⁶⁷.”

The number of patients registered in WRDS for the 2005 calendar year was used to estimate the prevalence of diabetes in the Waikato region, instead of the latest 2006-2007 data. The reasons for using the 2005 data are due to the frequency of review for Type 1 and Type 2 diabetes patients following the diagnosis, as outlined below:

- The frequency of review for Type 1 diabetes patients is a minimum of three to five years after diagnosis; and
- The frequency of review for Type 2 diabetes is at least every two years after diagnosis of diabetes.

The information presented below is extracted from the proceedings of Waikato Clinical School seminar published in the New Zealand Medical Journal “Diabetes Patients in Waikato and their hospital admission⁶⁸”, as the aim of the article was to examine the profile of diabetes patients registered with Waikato Regional Diabetes Service (WRDS) in 2005 and to estimate their hospital admission rates.

A total of 9936 patients were registered in the WRDS in 2005. The registrations were predominately European (67%), followed by Maori (20%), Indian (2.6%), Pacific People (2.3%) and Other Asian (1.6%). The number of diabetes patients in the Waikato has been increasing at a rapid pace at around 7% to 10% per year. The Indian diabetes patients in the Waikato out-numbered Pacific People. Around 86% of the admissions had Type 2 diabetes and the gender proportions were nearly equal at 51% male and 49% female.

⁶⁷ Joshy G, Lawrenson R. Status of diabetes and its complications in Waikato: A report to the Local Diabetes Team. Hamilton: Waikato Clinical School, University of Auckland, 2008

⁶⁸ Grace Joshy, Ross Lawrenson, Peter Dunn, Proceeding of Waikato Clinical School Research Seminar 15 March 2007, New Zealand Medical Journal 29 June 2007, [URL:http://www.nzma.org.nz/journal/120-1257/2625](http://www.nzma.org.nz/journal/120-1257/2625)

9.7 Diabetes Complications - WRDS Database

During 2005, a total of 6275 admissions were recorded, including 3287 day admissions. This resulted in 20,637 inpatient days in 2005.

The following table presents a detailed analysis of hospital admissions of diabetes patients for Cerebrovascular disease, CAD and renal and by age and ethnicity:

Table 119: Hospitalisation - WRDS patients in 2005 for diabetes related CAD, CVD and renal complications

		No. of Renal	No. of Renal	CAD	No. of CAD	Cerebrovascular	No. of Cerebrovascular
		Admissions	Patients	Admissions	Patients	Admissions	Disease Patients
Overall		1704	74 (1%)	281	210 (2%)	101	89 (1%)
Duration of Diabetes							
Years	<2	1	1 (0.1%)	11	10 (1%)	7	6 (1%)
	2-<5	16	3 (0.1%)	55	41 (2%)	25	22 (1%)
	5-<10	147	10 (0.3%)	78	58 (2%)	19	17 (1%)
	10+	1540	60 (1.6%)	137	101 (3%)	50	44 (1%)
Gender							
	F	668	34 (1%)	128	87 (2%)	48	44 (1%)
	M	1036	40 (1%)	153	123 (2%)	53	45 (1%)
Type of Diabetes							
	Type 1	421	20 (1%)	22	16 (1%)	5	5 (0%)
	Type 2	1283	54 (1%)	259	194 (2%)	96	84 (1%)
Age as in 2005							
	0-15		0 (0%)		0 (0%)		0 (0%)
	16-24		0 (0%)		0 (0%)		0 (0%)
	25-44	186	8 (1%)	7	5 (0%)	1	1 (0%)
	45-64	974	38 (1%)	86	62 (2%)	24	21 (1%)
	>65	544	28 (1%)	188	143 (3%)	76	67 (1%)
Ethnicity							
	Asian		0 (0%)	1	1 (1%)	1	1 (1%)
	European	295	25 (0%)	204	151 (2%)	80	71 (1%)
	Indian		0 (0%)	5	3 (1%)		0 (0%)
	NZ Maori	1284	47 (2%)	56	43 (2%)	19	16 (1%)
	Not Known	124	1 (0%)	10	7 (2%)		0 (0%)
	Other	1	1 (0%)	4	4 (2%)	1	1 (0%)
	P Islands		0 (0%)	1	1 (0%)		0 (0%)

In total there were 2,086 admissions related to diabetes complications from 373 diabetes patients. Around 79% of the admissions related to Type 2 diabetes. Overall, the number of admissions to CAD, Cerebrovascular disease and renal increased with increased duration of diabetes.

9.8 Admission of Diabetes Patients with Renal Complications

The number of renal admissions increased with the increased duration of diabetes. For example: 1,540 renal admissions were required for 60 renal patients with 10+ years duration of diabetes, when compared with 147 renal admissions for 10 renal patients who had diabetes for 5-10 years.

Admissions for renal complications of diabetes were highest (90%) among patients with 10+ years duration of diabetes.

The gender proportion of renal admissions was: 61% males and 39% females.

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The number of renal admissions was highest among 45-64 year olds (974 admissions) for 38 renal patients, when compared with 544 renal admissions for 28 renal patients aged 65+ years.

By ethnicity, the rate of renal admission was highest among Maori (47 Maori renal patients with 1284 admissions) when compared with Europeans (25 renal patients with 295 admissions).

Although the number of diabetes patients with renal complications was lower (74) when compared with CAD (210) and Cerebrovascular disease (89) complications, the number of renal admissions (1,704) was significantly higher than Cerebrovascular and CAD together (281 CAD and 101 Cerebrovascular disease).

9.9 Admission of Diabetes Patients with Coronary Artery Diseases (CAD) Complications

Like renal admissions, the number of CAD admissions increased with increasing duration of diabetes (10+ years).

The number of diabetes patients with CAD admission was higher among males (123) than females (87).

The number of CAD admissions was highest among 65+ age groups (No. of CAD patients: 143 and No. of CAD admissions 188).

9.10 Admission of Diabetes Patients with Cerebrovascular Complications

Both 45-64 years and 65+ age groups showed comparable trends in the number of admissions.

9.11 Retinal Screening for Diabetes Patients

The retinal screening data is extracted from the WRDS database for periodic reporting. In 2007, there were 3753 diabetes patients screened for retinopathy.

Table 120: Number of patients screened for retinopathy and Achievement of Targets by ethnicity - 2007

Ethnicity	No. Retinal Screening	Waikato DHB Achievement	Waikato DHB Target
Maori	624	52%	75%
Pacific	107	53%	75%
All others	3022	60%	75%
Total	3753	58%	

Based on the retinal screening data it is evident that Maori, Pacific and Indian patients have significantly higher risk of vision threatening retinopathy compared with Europeans (odds ratio 1.53, 2.18 and 2.86 respectively). A similar trend is

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noticed for non vision threatening retinopathy among the same ethnic groups, however the odds ratio of risks are slightly lower when compared with vision threatening retinopathy⁶⁹.

Table 121: Odds ratio of risk of vision threatening retinopathy all other ethnicities compared with European - Waikato 2006

Ethnic Groups (each ethnic group compared with European)	Non Vision Threatening Retinopathy	Vision Threatening Retinopathy
Maori vs Europeans (=1)	1.52	1.53
Pacific People vs Europeans (=1)	2.66	2.18
Asians vs Europeans (=1)	1.42	2.13
Indians vs Europeans (=1)	1.83	2.86
Females vs Males (=1)	0.84	0.69
Type 1 vs Type 2 (=1)	1.32	1.72

Odds Ratio (95% Confidence Intervals (CI) for Retinopathy.

A partnership between the Health Research Council of New Zealand (HRC) and the Ministry of Health, the first priority of the National Diabetes Research Strategy (NDRS) was the development of a community-based diabetes intervention that would reduce the incidence and impact of diabetes in high-risk communities. The primary focus of the research project funded was to demonstrate the most effective and affordable means of achieving this in the New Zealand community setting, with a particular focus on high-risk populations. The project funded was Te Wai o Rona, a diabetes prevention strategy run through the University of Auckland. Te Wai o Rona, a partnership between Maori, health workers and researchers was designed to demonstrate a significant reduction in diabetes incidence in Maori over three years. The data from the screening program for retinopathy confirms that the:

- Prevalence of retinopathy at diagnosis was lower than in previous studies, yet the prevalence of nephropathy among Maori remained high.
- Case detection of diabetes in the community may be improving but programmes targeting those at risk of diabetes, including programmes promoting smoking cessation, will be needed to reduce the risk of renal disease among Maori with diabetes.
- Maori patients tend to develop Cerebrovascular disease and nephropathy prior to the diagnosis of diabetes.

9.12 Prevalence of Diabetes - WRDS 2005

Around 90% of diabetes patients in the Waikato region are registered with the WRDS database. The database captures a single self-selected ethnicity for patients and is different from multiple ethnicity selection in the census.

⁶⁹ Diabetes Status in Waikato, Presentation to LDT 16th Oct 2007, Grace Joshy, Research Fellow, Epidemiology, Waikato Clinical School, University of Auckland

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Table 122: Patients registrations with WRDS Database: 2003-2005

Year	No: of diabetes Patients	Newly Diagnosed	% increase from Previous Year	No: of Deaths
2005	9936	796	7%	210
2004	9303	1005	11%	163
2003	8387	769	10%	89

Of the 9936 patients, 67% was European, followed by Maori at 20%, Indian at 2.6%, Pacific People at 2.3% and Other Asian at 1.6%.

86% had Type 2 diabetes and 51% were male.

Europeans are diagnosed with Type 2 diabetes at a mean age of 59 years where as other ethnic groups are diagnosed a nearly decade earlier, as shown in Table 5 and Table 6 below:

- Maori at 48 years of age
- Indians at 49 years of age
- Pacific and Asians at 50 years of age
- Of the 9936 patients, 85% (8013) had attended a retinal screening after 2002. Nearly 94% of patients were residing within the Waikato DHB area.

Table 123: Number of diabetes patients in Waikato - WRDS Register 2005

Age	European	Māori	Pacific People	Asian	Total
0-9	16	3	0	0	20
10-19	125	25	1	2	159
20-29	218	57	3	8	291
30-39	280	144	17	31	503
40-49	573	351	47	83	1144
50-59	1122	581	57	118	1998
60-69	1610	530	67	106	2474
70-79	1807	263	29	66	2287
80+	945	52	7	3	1060
Total	6696	2006	228	417	9936

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Table 124: Prevalence of diabetes in Waikato - WRDS Register 2005

Age	European	Māori	Pacific People	Asian	Total
0-9	0.05%	0%	0%	0%	0%
10-19	0%	0%	0%	0%	0%
20-29	1%	1%	0%	0%	1%
30-39	1%	2%	1%	1%	1%
40-49	2%	4%	5%	3%	2%
50-59	4%	11%	10%	9%	5%
60-69	8%	19%	18%	17%	9%
70-79	12%	20%	19%	22%	12%
80+	10%	17%	19%	4%	10%
Age Standardised Prevalence*	3%	6%	5%	4%	

*Standardised to 2006 NZ Population.

9.13 General Practice (GP) based Prevalence Estimates

A Waikato Clinical School summer studentship project⁶⁷ estimated the prevalence of diabetes in Hamilton through retrospective review of patient records. Patients registered with three Hamilton practices, with a total population of 36,321, were reviewed for diagnosis of diabetes. Cases were identified using diagnosis codes for diabetes, prescriptions for diabetes medications and lab tests for HbA1C. In cases of uncertainty, the patient's full record was checked to validate the diagnosis.

The ethnic compositions of the patients registered with general practices were:

Table 125: Diabetes patients registered with General Practices in Hamilton

Ethnicity	Patients with Diabetes Registered with GPs
European	79% (920)
Maori	10% (149)
Pacific People	2% (26)

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Ethnicity	Patients with Diabetes Registered with GPs
Asians	4% (49)
Other	3% (22)
Indian	2% (67)
Total	100% (1233)

Results showed that prevalence rates vary widely across subgroups of age and ethnicity.

Table 126: General practice based prevalence of diabetes in Hamilton - 2007 by Ethnicity, diabetes type and age group

Age	Diabetes Type 2						Type 1
	European	Māori	Pacific People	Asian	Indian	Total	Total
0-9	-	-	-	-	-	-	0.6
10-19	0.1	0.0	0.0	0.0	0.0	0.1	3.4
20-29	0.1	0.6	0.0	0.4	1.8	0.3	3.5
30-39	0.6	4.3	1.9	0.9	2.4	1.1	4.1
40-49	1.7	4.9	3.6	4.5	10.1	2.3	3.0
50-59	3.2	15.0	21.0	7.7	24.7	4.7	6.4
60-69	7.8	19.7	25.0	16.7	29.5	8.9	4.5
70-79	11.7	41.0	20.0	30.6	45.8	13.2	5.6
80+	14.8	15.8	0.0	20.0	33.3	14.7	1.0
Total*	1.9	7.8	6.5	12.8		3.0	3.6

*Age standardised to 2006 NZ population.

Indians included with Asians for age standardised prevalence. Prevalence rates are per 100 for Type 2 and per 1000 for Type 1.

Note: Although Indians out numbered Pacific People in the WRDS database, ethnic specific prevalence estimates for Indians, Other Asians could not be calculated due to lack of population estimates for these groups in the public domain. Ethnicity is self-selected by patients and is different from multiple ethnicity selection in Census.

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In the 40-70 age groups, prevalence rates among all the non-European ethnic groups are 2-7 times higher than that among Europeans.

Of particular note are high rates among Asians, who were previously thought to have a prevalence profile similar to that among Europeans, and Indians who have the highest rates of all.

9.14 Comparison of WRDS and GP Register

The comparison of the WRDS database with the General Practice Register showed that:

- 60+ age groups seem to register more with GPs (around 20% more than WRDS)
- Patients with visual loss or known eye disease are not referred for retinal screening.
- WRDS captures more patients in the age brackets 00-59 years and this may explain the loss of older patients in WRDS.

Note: Ethnic specific prevalence estimates for Indians and Other Asians could not be calculated. Although Indians outnumbered Pacific People in the WRDS database, ethnic specific prevalence estimates for Indians, Other Asians could not be calculated due to lack of population estimates for these groups in the public domain. Ethnicity is self-selected by patients and is different from multiple ethnicity selection in Census.

9.14.1 Incidence of diabetes among people <25 Years of age

The above study showed that:

- Incidence was 17.9 per 100,000 population in 1997-2002, which equates to around 23 new cases per year.
- A significant difference in ethnicity was noted for Type 2 diabetes, with Maori having a much higher incidence rate.

9.15 Hospitalisation for Diabetes Mellitus - NZHIS

The number of hospitalisations for diabetes mellitus from 2000 to 2006 was 5475, (2531 female and 2943 male and 1 undefined). 71% of the hospitalisation was for non-insulin dependent diabetes and 29% was for insulin dependent diabetes mellitus.

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Table 127: Hospitalisation to Diabetes Mellitus - Waikato

Year	E10 - Insulin-dependent diabetes mellitus	E11 - Noninsulin-dependent diabetes mellitus	E13 - Other specified diabetes mellitus	E14 - Unspecified diabetes mellitus	Total
2000	145	320		2	467
2001	240	453	1	1	695
2002	271	536	2	3	812
2003	209	622		2	833
2004	173	597	1	10	781
2005	245	608	7	3	863
2006	279	733	8	4	1024
Grand Total	1562	3869	19	25	5475

The ethnic composition of hospitalisation was:

Table 128: Ethnic composition of Hospitalisation for diabetes - Waikato

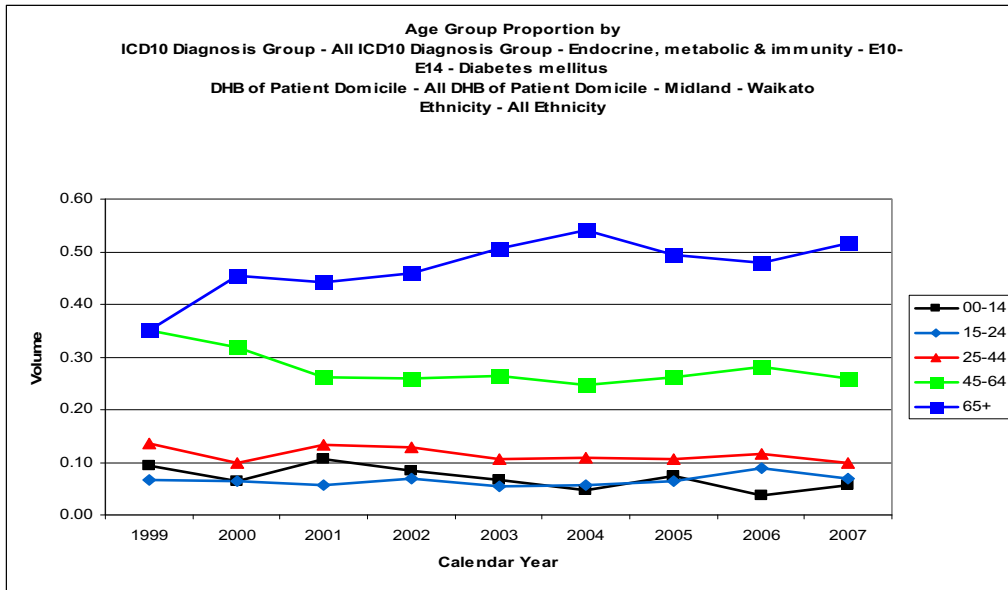
Year	Maori	Asian	Other	Total Other	Pacific People	Total
2000	124	7	334	341	2	467
2001	183	9	490	499	13	695
2002	189	18	592	610	13	812
2003	213	15	586	601	19	833
2004	183	21	562	583	15	781
2005	190	23	631	654	19	863
2006	278	30	692	722	24	1024
Grand Total	1360	123	3887	4010	105	5475

The gender proportion of hospitalisation for diabetes was 46% females and 54% males. The proportions were consistent over the reported years. The hospitalisation split by deprivation quintile was similar each year with more than 80% of hospitalisations from deprivation quintiles 3 to 5.

Most hospitalisation for diabetes was among the 65+ age groups, increasing over the reported years to 52% in 2004. The proportion of hospitalisation decreased for the 45-64 age groups and for other age groups was steady over the reporting period.

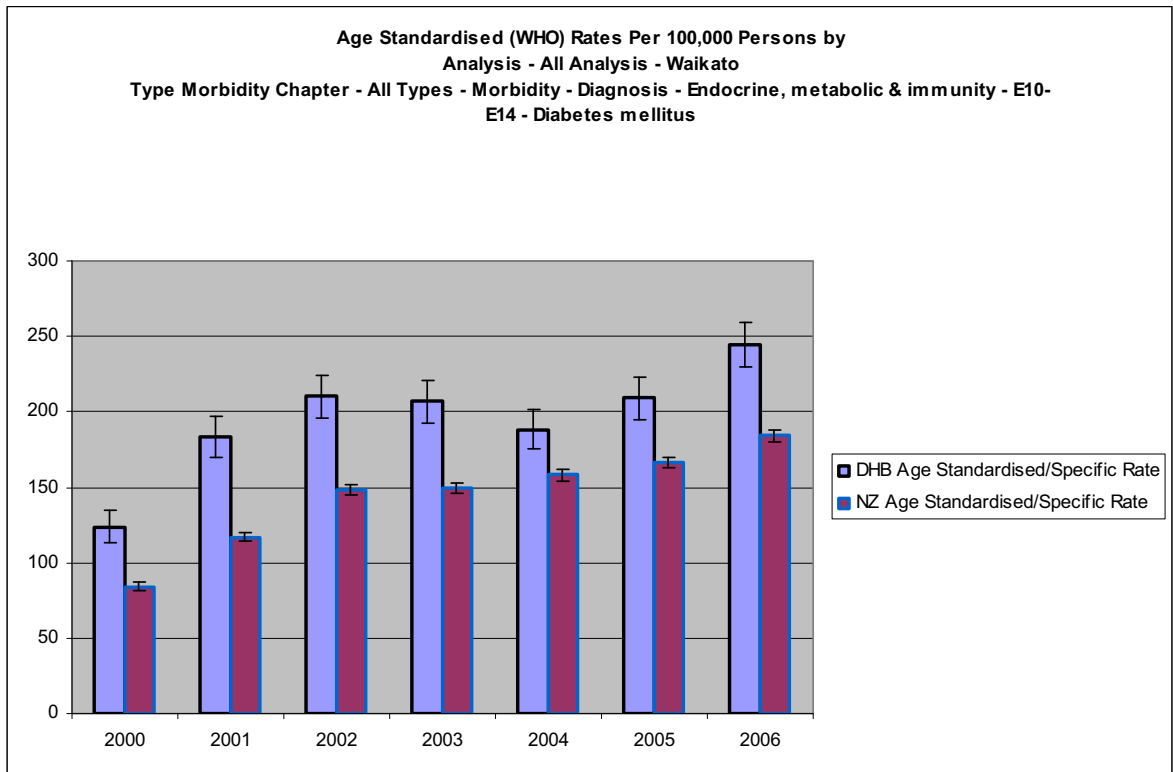
Diabetes Mellitus

Graph 48: Age Group proportion of hospitalisation for diabetes - Waikato



In Waikato, the age standardised rate for diabetes hospitalisation increased to 244.57 per 100,000 in 2006 from 209.21 in 2005. The Waikato age standardised rate was higher than the national age standardised rate of 184.07 per 100,000 in 2006.

Graph 49: Age standardised rate of hospitalisation for diabetes - Waikato rate compared to New Zealand rate



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9.15.1 Hospitalisation for Insulin Dependent Diabetes (Type 1)

All Ethnic Groups

The total number of hospitalisations for insulin dependent diabetes from 2000 to 2006 was 1562 (827 female and 735 male).

The ethnic composition of hospitalisation was:

Table 129: Hospitalisation for insulin dependent diabetes by ethnicity - Waikato

Year	Maori	Asian	Other	Total Other	Pacific People	Total
2000	26	2	116	118	1	145
2001	35	1	203	204	1	240
2002	29	4	238	242		271
2003	25	1	182	183	1	209
2004	23	2	148	150		173
2005	24	1	219	220	1	245
2006	30	1	248	249		279
Grand Total	192	12	1354	1366	4	1562

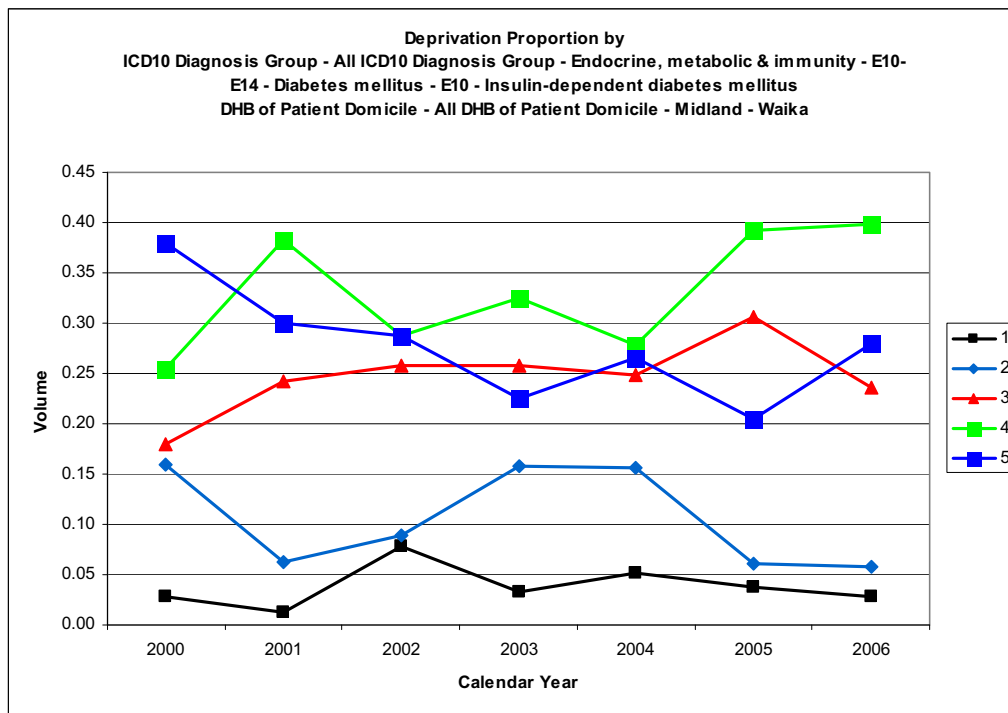
As the volume of hospitalisation was too low among Asian for insulin dependent diabetes, further detailed analysis of Other ethnic group will include Asians.

The gender proportion fluctuated close to 50/50 for all seven years.

The hospitalisation split deprivation quintile was similar each year with more than 75% of hospitalisations from quintile 3 to 5.

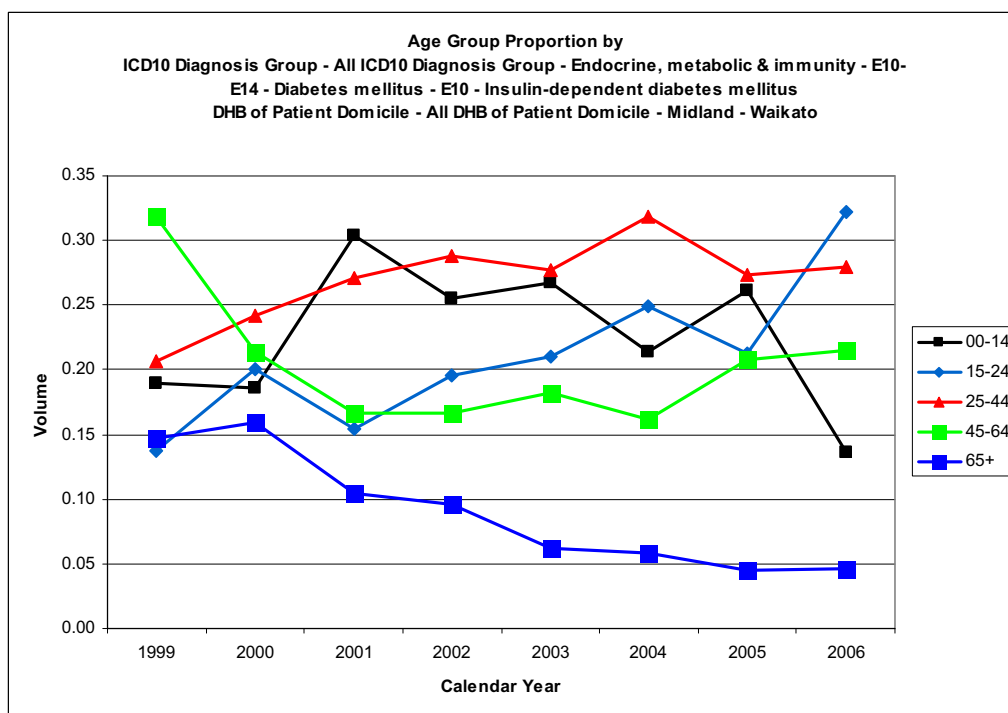
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Graph 50: Deprivation proportion of hospitalisation for insulin dependent diabetes - Waikato



Most hospitalisation for insulin dependent diabetes was among the younger age groups. The proportion of hospitalisation for the 65+ age groups was steadily at decreasing over the reporting period.

Graph 51: Age proportion of hospitalisation for insulin dependent diabetes - Waikato



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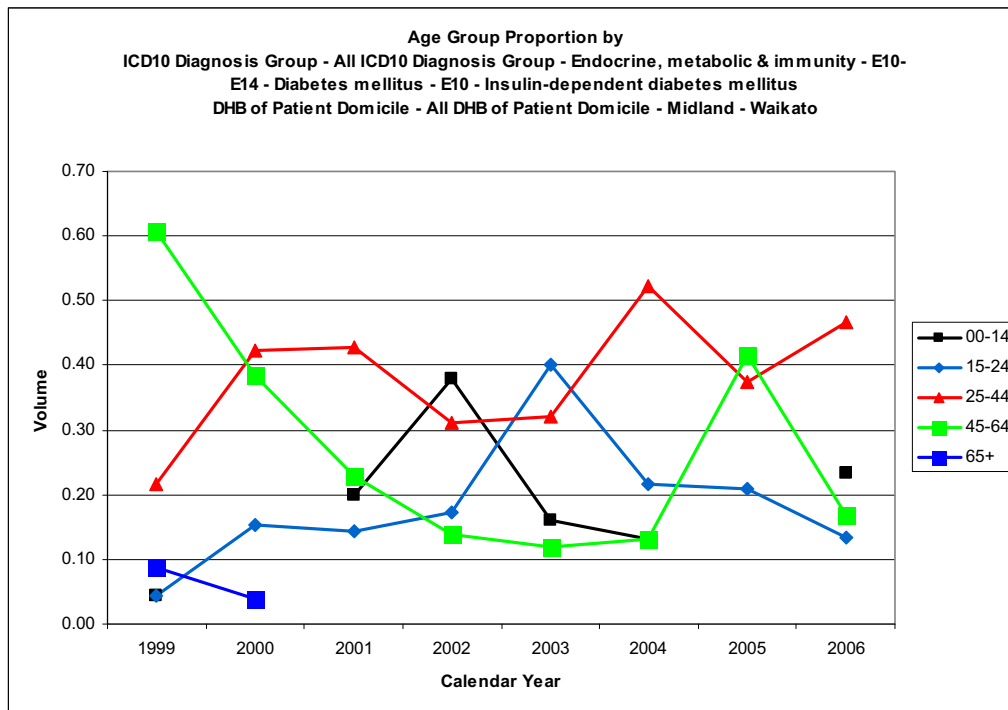
9.15.2 Insulin Dependent Diabetes Hospitalisation - Maori

The number of Maori hospitalisations was 192 (101 female and 91 male). The gender proportions was stable with 50/50 split, but, over the last four years the incidence of hospitalisation for insulin dependent diabetes increased in Maori females and decreased in males

Maori hospitalisation was highest in the deprivation quintile 5, fluctuating between 50% and 77%. Most other hospitalisations were in quintile 3 and the remaining quintiles were only occasionally reported in the 2000-2006 data.

Age proportion of hospitalisation among Maori fluctuated across all age groups, however the 25-44 age group was highest in most years.

Graph 52: Age group proportion of hospitalisation for insulin dependent diabetes - Waikato Maori



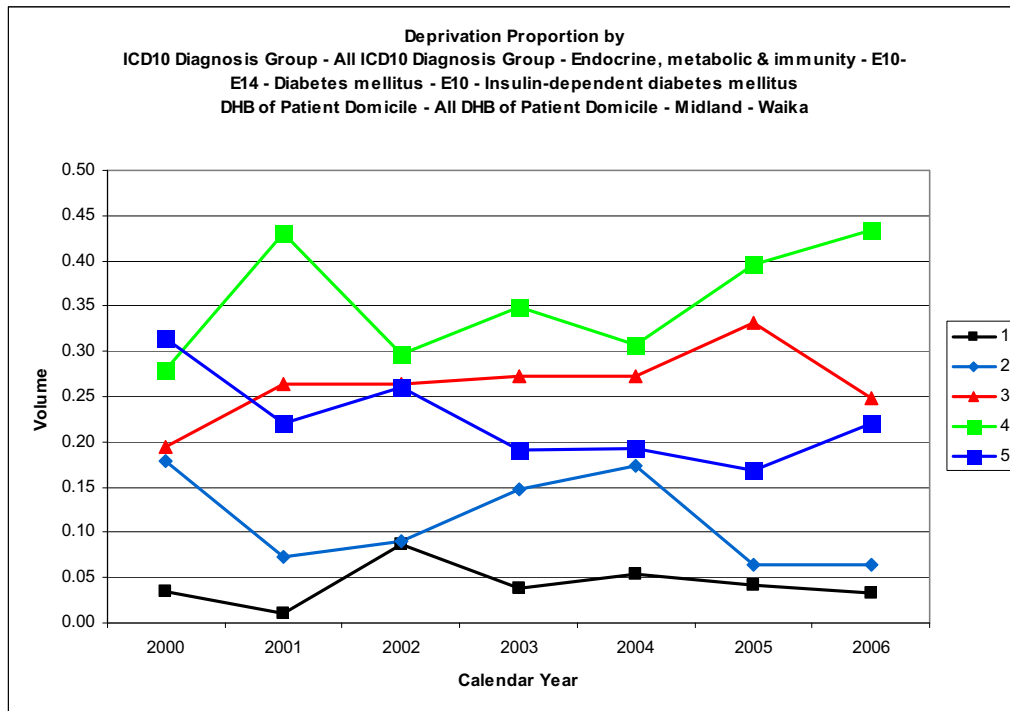
9.15.3 Insulin Dependent Hospitalisation - Other Ethnic Groups

The number of Other Ethnic Group hospitalisations was 1,366 (725 female and 641 male). There was no significant difference in the number of hospitalisations for either gender in any year although over the seven years, slightly more females were hospitalised.

Among Other ethnic groups, the incidence of hospitalisation was spread across the deprivation quintiles 3 to 5, although higher among quintile 3 in all years since 2001 (43% for 2006 year).

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Graph 53: Deprivation proportion of hospitalisation for insulin dependent diabetes - Waikato Other



The age proportion of hospitalisation was highest among 15-24 age groups followed by 25-44 age groups highlighting that increasingly younger people were hospitalised for insulin dependent diabetes.

Table 130: Age group proportion of hospitalisation for insulin dependent diabetes - Waikato Other

Year	Age Groups				
	00-14	15-24	25-44	45-64	65+
2000	23%	21%	19%	18%	19%
2001	32%	16%	25%	15%	12%
2002	24%	20%	29%	17%	11%
2003	28%	19%	27%	19%	7%
2004	23%	25%	29%	17%	7%
2005	29%	21%	26%	18%	5%
2006	12%	35%	26%	22%	5%

9.16 Ethnic Comparison of Admissions - WRDS vs NZHIS

The 9936 WRDS registered diabetes patients in 2005 had a total of 6275 admissions in 2005 including 3287 day admissions. This resulted in 20,637 inpatient days in 2005⁴. Analysis using NZHIS records could pick up only 863 admissions.

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Table 131 Number of patients with hospital admissions by primary diagnosis

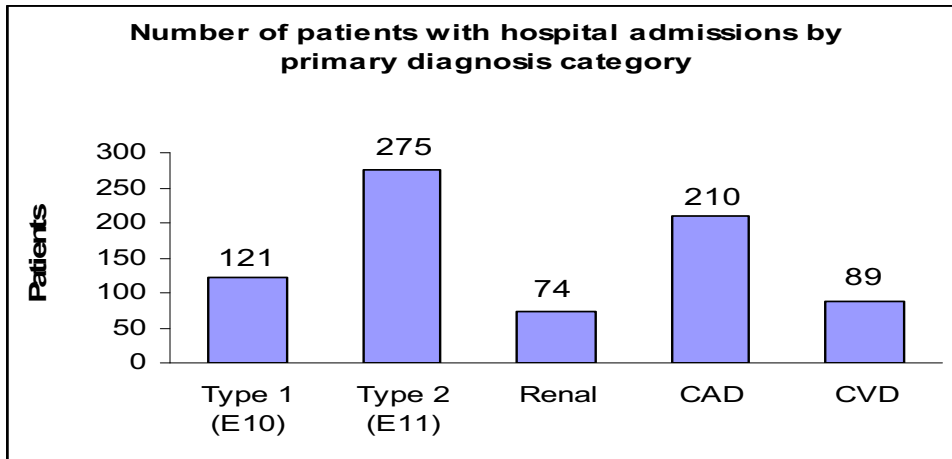
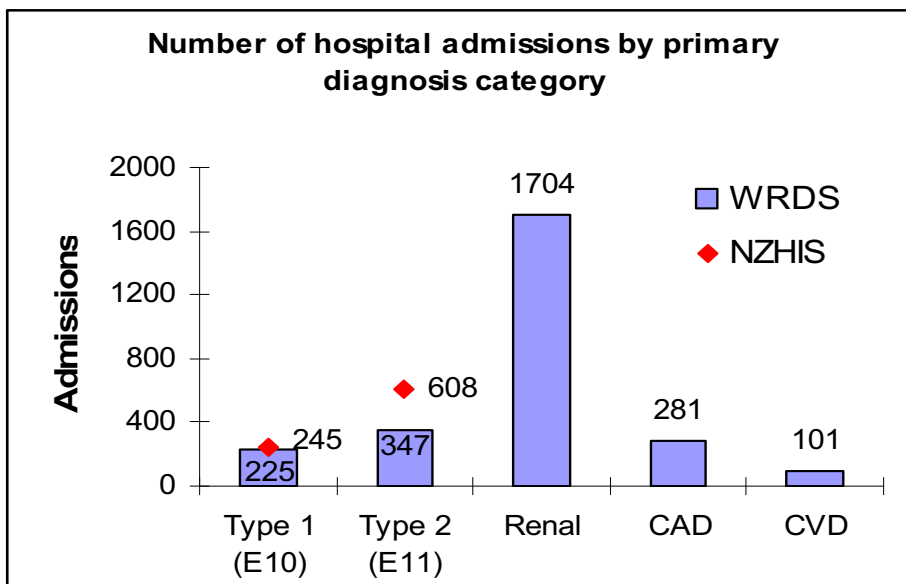


Table 132: Comparison of hospital admissions WRDS and NZHIS



Based on the studies, it is evident that Maori patients showed significantly high renal admission risk (odds ratio of 9) compared with Europeans, however the risk of admissions was similar to European for coronary artery disease admissions or cardiovascular diseases. Further detailed study is necessary to assess the high rates of renal admissions among Maori diabetes patients.

As shown in Table 11 below, Europeans were diagnosed with Type 2 diabetes at a mean age of 59 years, but the other ethnic groups were diagnosed a decade earlier. Maori were diagnosed with Type 2 diabetes at a mean age of 48, Indian 49, Pacific and Asians at 50 years.

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Table 133: Ethnic comparison of diabetes hospitalisation - WRDS 2005

Diabetes Hospitalisation	Maori	Other	Pacific People	Indian	Other Asians
WRDS 2005 Registrations	20.0%	67.0%	2.3%	2.6%	1.6%
Type 2 Diabetes Based on WRDS 2005 Data	Mean Age 48 Years	Mean Age 59 Years	Mean Age 50 years	Mean Age 49 Years	Mean Age 50 years
Type 1 Diabetes - 2000-2006	Aged 25-44 @ 74%	Aged 15-24 @ 35%	Low Volume		
NZDeprivation Quintiles 2000-2006	Type 1 & 2 Diabetes: Q5 @ >55%	Type 1 & 2: 22%, 30%, 36% - Q3 to Q5	Type 1 & 2: 21%, 13%, 50% - Q3 to Q5	Type 1 & 2: 31%, 45%, 10% - Q3 to Q5	

Of the total hospitalisation for Type 1 diabetes (insulin dependent diabetes) among Waikato Maori children aged 00-14 years approximately 81% of the admissions were in 10-14 year olds. Similarly of the total admissions among Maori youth aged 15-24 years, around 50% of the admissions were in 20-24 year olds.

Among the Waikato Other ethnic group, the rate of hospitalisation was near equal among 00-14 years and 15-24 year olds at 24% and 23% for 2000 to 2006.

9.16.1 Hospitalisation for Insulin Dependent Diabetes

In 2006, the age proportion of hospitalisation for insulin dependent diabetes among Waikato Maori was highest in those aged 25-44 years at 74%.

The high rate of Maori hospitalisation from deprivation quintile 5 may correlate to the fact that more Maori live in this quintile (around 50-70%) compared to other ethnic groups.

Among Waikato Other ethnic group approximately 35% of insulin dependent hospitalisation was in 15-24 age groups.

The low volume of hospitalisation for insulin dependent diabetes among Waikato Asians and Pacific People precludes detailed analysis.

9.16.2 Hospitalisation for Non Insulin Dependent Diabetes

Among Waikato Maori, Asians and Pacific People, the hospitalisation was highest among 45-64 age groups, however among Other 78% of hospitalisation was in 65+ year olds.

Deprivation proportions for hospitalisation among Waikato Maori and Pacific People were highest in quintile 5, but among Asians and Other ethnic group the trend spread across quintile 3 to 5.

Age Standardised Rate of Hospitalisations by Ethnicity

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The following table presents the age specific rates of hospitalisation for diabetes in the Waikato compared with the national rates.

Table 134: Ethnic comparison of Age standardised rate of hospitalisation 2006

Waikato Age Specific Rates per 100,000 Population Compared to National Rates - 2006 Hospitalisation for Diabetes Mellitus								
Age Groups:	15-24		25-44		45-64		65+	
Ethnicity	Waikato	NZ	Waikato	NZ	Waikato	NZ	Waikato	NZ
Maori			170.8	156.7	1108.2	787.3	3566.7	2441.4
Other	234.1	107.8	124.9	66.8	209.8	163.9	961.0	770.3
Pacific People					1570.20	1388.8	1025.6	3259.8

A summary of findings based on the above age specific rate were:

- Waikato age specific rates across the three ethnic groups (for age groups 15 to 64+) were consistently higher than the national rates.
- The age specific rate of hospitalisation for Waikato Maori aged 45-64 years old was over 5 times higher than the Other ethnic group rate, however the age specific rate among Pacific People was nearly eight times higher than the Other ethnic group, but this increase may be attributable to the low volume of data.
- A similar trend was noticed among the Maori 65+ age groups, as the rate of hospitalisation was 4 times higher than the Other ethnic group, however among Pacific People aged 65+ the rate was slightly higher than the Other ethnic group.

9.17 Mortality to Diabetes - Waikato

9.17.1 NZHIS - Mortality Data Analysis - Diabetes

In Waikato, the total number of deaths to diabetes, where diabetes was reported as the primary cause of death, was 507 (227 female and 280 male) for the period 1998 to 2004. Around 81% of the deaths were related to non insulin dependent diabetes.

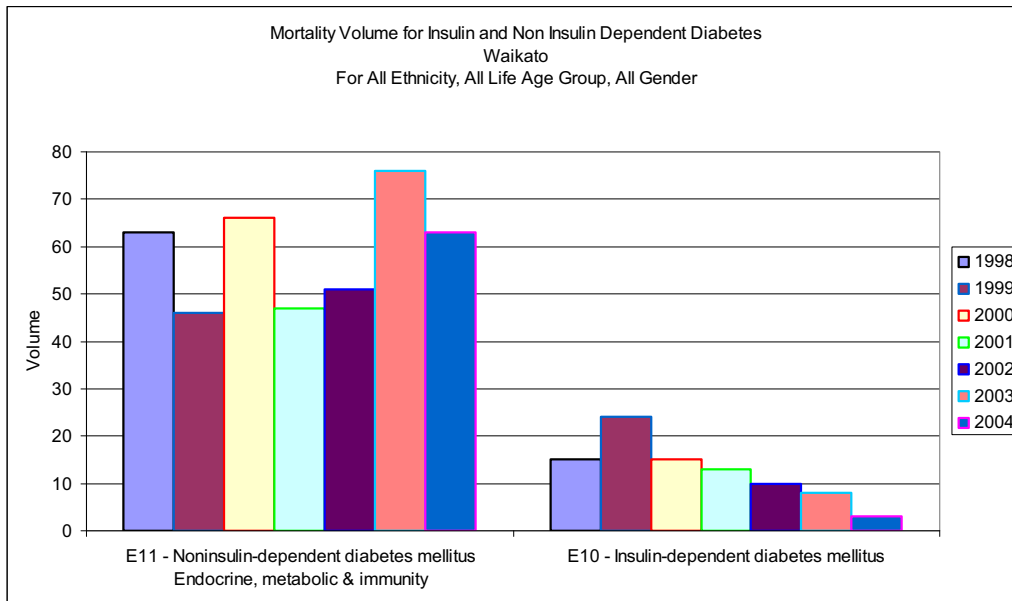
Table 135: Mortality to Diabetes Mellitus - Waikato All Ethnic Groups

Mortality to Diabetes Mellitus	1998	1999	2000	2001	2002	2003	2004	Total
E11 - Noninsulin-dependent diabetes mellitus	63	46	66	47	51	76	63	412
E10 - Insulin-dependent diabetes mellitus	15	24	15	13	10	8	3	88
E14 - Unspecified diabetes mellitus			2	1	1	1	2	7
Grand Total - Mortality	78	70	83	61	62	85	68	507

For non-insulin dependent diabetes, the number of deaths fluctuated for the seven year reporting period, while the number of deaths to insulin dependent diabetes decreased.

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Graph 54: Mortality Trend over 1998-2004 - Insulin and non-insulin dependent diabetes - Waikato



Mortality – insulin dependent diabetes

The total deaths to insulin dependent diabetes was 88 (36 female and 52 male) for the period 1998-2004. There were no deaths among Pacific People and only one death recorded as Asian. The number of deaths decreased steadily over the years across all ethnic groups.

Table 136: Mortality to Insulin Dependent diabetes by ethnicity - Waikato

Year	Maori	Other	Asians	Total
1998	3	12		15
1999	7	17		24
2000	2	13	1	15
2001	1	12		13
2002	2	8		10
2003	1	7		8
2004	1	2		3
Grand Total	17	71		88

The incidence of death was consistently highest among the more deprived quintiles 3 to 5 with very few deaths from this cause in deprivation quintiles 1 and 2. For these years, age proportion of deaths from insulin dependent diabetes were split with 33% in the 25-64 age groups and 67% in the 65+ age groups.

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Table 137: Age proportion of mortality related to insulin dependent diabetes - Waikato all ethnic groups

Year	Age Groups							
	25-44	45-64	65+	65-69	70-74	75-79	80-84	85+
1998		33%	67%		20%	20%		27%
1999		33%	67%	8%	8%	17%	13%	21%
2000	7%	13%	80%	27%	27%	7%	7%	13%
2001	23%	8%	69%	8%	15%	8%	15%	23%
2002	10%	40%	50%		10%	20%		20%
2003	25%		75%	13%	25%	13%	13%	13%
2004			100%	33%		67%		

The age standardised rate of deaths to insulin dependent diabetes decreased to the lowest since the year 2000 at 2.48 per 100,000 in 2003 and 2004. The Waikato age standardised rate was within the national age standardised rate confidence levels.

Mortality – Non insulin dependent diabetes

Total deaths to non-insulin dependent diabetes was 412 (187 female and 225 male) for the period 1998-2004. The ethnic composition of these deaths was:

Table 138: Mortality to Non-insulin dependent diabetes by ethnic groups - Waikato

Year	Maori	Asian	Other	Pacific People	Total
1998	18		43	2	63
1999	17	1	25	3	46
2000	22	1	43		66
2001	16	1	29	1	47
2002	17	1	32	1	51
2003	23	1	51	1	76
2004	22	1	37	3	63
Grand Total	135	6	260	11	412

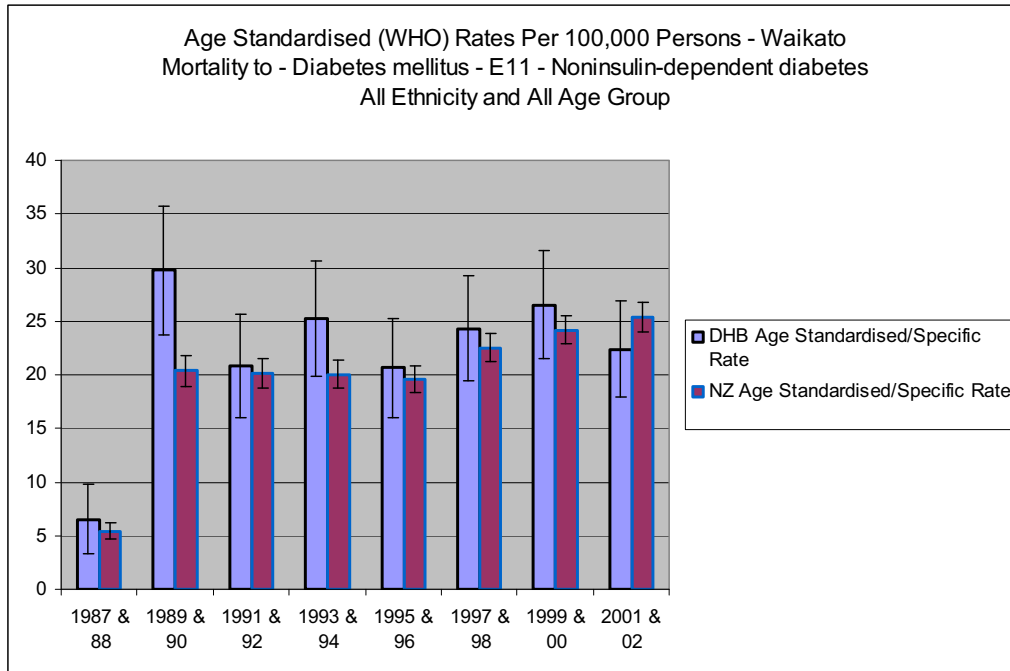
The deprivation trend showed deaths in quintile 1 and 2 decreased to less than 10% of all deaths to non-insulin dependent diabetes. The remaining 90% fluctuated across deprivation quintiles 3 to 5.

Across the seven year period (1999 to 2004), 75% of deaths caused by non insulin dependent diabetes were in 65+ age groups and 25% in 45-64 age groups.

The age standardised rate of death from non-insulin dependent diabetes is increasing nationally and locally. The Waikato rate is not significantly different from the national rate. In Waikato, the age standardised rate increased slightly, to 30.01 per 100,000 in 2003 and 2004 from 22.36 in 2001 and 2002.

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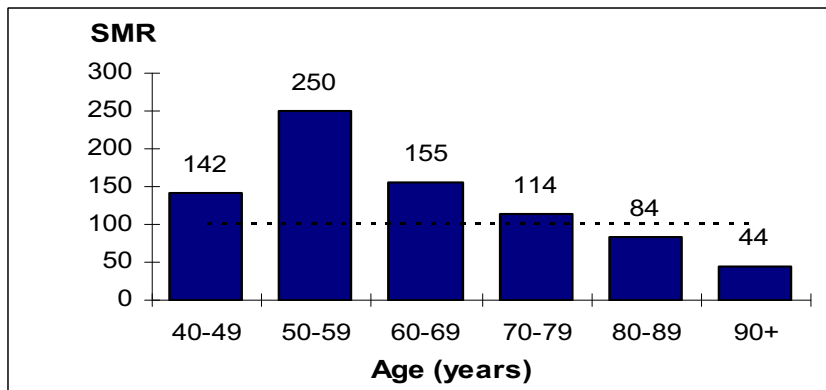
Graph 55: Age Standardised rate of mortality to non-insulin dependent diabetes - Waikato rate compared to New Zealand rate



9.18 Mortality to Diabetes - WRDS Data Analysis

In 2005, 210 deaths were recorded among the 9936 diabetes patients registered with WRDS.

Graph 56: Standardised mortality ratios for WRDS Patients in 2005



Diabetes patients aged 40+ have higher mortality rates compared with NZ population, as shown in Graph 51 above.

9.19 Ethnic comparison of Mortality to Non insulin Dependent Diabetes - NZHIS

As the low volume of mortality to insulin dependent diabetes precludes detailed ethnic comparison, the table below presents only the ethnic composition of mortality to non insulin dependent diabetes.

Table 139: Ethnic comparison of mortality to non insulin dependent diabetes 1998-2004 (NZHIS)

Non Insulin Dependent Diabetes Mortality 1998-2004	Volume	Gender Proportion	Age Group Proportion		Age Specific Rate - Waikato - per 100,000 population		Deprivation Quintile		
			45-64 Years	65+ Years	45-64 Years	65+ Years	3	4	5
Maori	135	F:45% M:50%	50%	50%	223.2	811.8		23%	50%
Other	266	50% M/F		92%	10.8	220.8	27%	30%	41%
Pacific People	11	F:33% M:67%	67%	33%	Low Volume	Low Volume	67%		33%

The key findings from this table (1998-2004) were as follows:

- The proportion of age at death among Waikato Maori spread equally across the 45-64 and 65+ age groups (at 50% each), however among Other ethnic group 92% of the death occurred among 65+ age group (around 42% in 85+, 21% in 80-84 and 13% in 75-79 age groups).
- Similar to Maori, among Waikato Pacific People around 67% of deaths occurred in 45-64 age groups and 33% among 65+ age groups.
- Around 50% of death among Maori was in the NZ Deprivation quintile 5.
- Waikato Maori age specific rate of mortality among 45-64 year olds increased to 223.2 per 100,000 population in 2003 and 2004. This rate was higher than the national rate of 167.9 for the same periods.
- Around 90% of deaths among Other ethnic groups was in the highest deprivation quintile 3 to 5.
- The age specific rate among Waikato Other ethnic group aged 65+ years increased to 220.8 per 100,000 population in 2003 and 2004 and this rate was higher than the national rate of 203.1 for the same period.

9.20 “Get Checked” Programme - Waikato

The Get Checked programme is funded by the Ministry of Health and ensures that every New Zealander with diabetes can have a free annual check up with their GP or GP practice nurse.

The “Get Checked” programme’s objectives are to:

- Systematically screen for the risk factors and complications of diabetes to promote early detection and intervention;
- Agree on an updated treatment plan for each person with diabetes;
- Prescribe treatment and refer people for specialist or other care if appropriate;

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- Update the information in the diabetes register, which is used as a basis of clinical audit and for planning diabetes services in the area;
- Improve the planning and co-ordination of services delivered by all healthcare providers; and
- Decrease the barriers to accessing high quality care for Māori and Pacific Island peoples.

The free annual “Get checked” programme utilisation by the Waikato providers for 2007 year showed that around 97% of the utilisation was from Pinnacle (including Te Kohao/FH) and 3% from the Maori providers shown below:

Table 140: Number patients who utilised the Get Checked Programme by Waikato Providers

Get Checked Providers	Totals with Diabetes by Ethnicity	Type 1 Diabetes	Type 2 Diabetes	Total Type 1 & Type 2	Retinal Scr. or Opth exam in last 2 yrs	HBA1c betw 7 and 8	HBA1c > 8	No. of current smokers	No. on ACE inhibitors	No. of people with cholesterol reported	No. of people on statins
Pinnacle	Maori	44	937	981	519	263	409	261	658	981	555
(incl Te Kohao FH)	Pacific People	6	189	195	104	60	89	37	131	195	120
	All others	356	4661	5017	2996	1462	1095	481	2939	5017	2842
Total - Pinnacle		406	6787	6193	3619	1785	1693	779	3728	6193	3617
Te Rohe Potae	Maori	8	16	24	5	6	8	5	14	24	5
	Pacific People	0	0	0	0	0	0	0	0	0	0
	All others	1	2	3	0	0	1	1	1	2	0
Total Te Rohe Potae	Total	9	18	27	5	6	9	6	15	27	5
Raukura Hauora	Maori	17	124	141	57	49	29	49	32	6	13
	Pacific People	0	4	4	2	1	2	0	0	1	0
	All others	3	4	7	2	1	0	0	0	0	0
Total Raukura Hauora	Total	20	132	152	61	51	31	49	32	7	13
Te Korowai Hauora o Hauraki	Maori	8	40	48	28	9	12	16	25	37	14
	Pacific People	0	2	2	1	0	1	1	1	2	0
	All others	2	24	26	19	4	7	6	18	22	15
Total Te Korowai Hauora o Hauraki	Total	10	66	76	48	13	20	23	44	61	29
Kokiri Trust	No Information Available										
Toi Ora PHO 6 months only	Maori	0	14	14	15	3	6	8	0	15	9
	Pacific People	0	0	0	0	0	0	0	0	0	0
	All others	0	5	5	5	0	5	1	0	5	2
Total Toi Ora PHO	Total	0	19	19	20	3	11	9	0	20	11
AGGREGATED TOTALS		445	6022	6316	3753	1858	1664	866	3819	6308	3676
	Maori	77	1131	1208	624	330	464	339	729	1064	596
	Pacific People	6	195	201	107	61	92	38	132	198	120
	All others	362	4696	5058	3022	1467	1108	489	2958	5046	2859
AGGREGATED TOTALS		445	6022	6467	3753	1858	1664	866	3819	6308	3676

In 2007, although utilisation for Type 2 diabetes increased slightly, the increase could be attributable to the increase in the rate of diabetes prevalence in Waikato population.

Table 141: Utilisation of Get Checked Programme by ethnicity - 2007

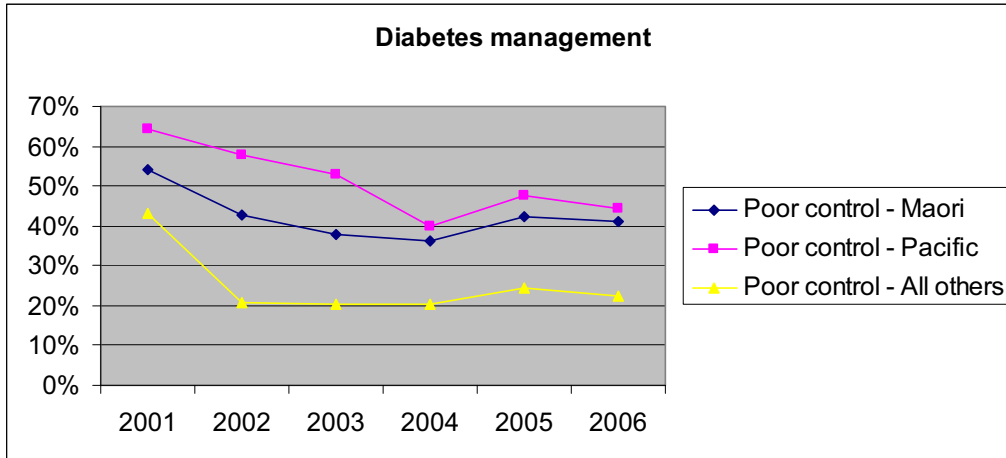
2007 Enrolment for Get Checked	Type 1 diabetes	Type 2 Diabetes	Total Enroled for Get Checked	Population prevalence	Achieved	Waikato DHB Target
Maori	77	1131	1208	3427	35%	48%
Pacific	6	195	201	320	63%	70%
All others	362	4696	5058	7314	69%	73%
Total Enrolment 2007	445	6022	6467	11061	58%	66%
Total Enrolment 2006	493	5939	6432	10247	63%	66%

The utilisation rates for Maori and Pacific People were steady over the 2005-2006 years, although the rates dropped significantly from 2001 (54% and 64%

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respectively) to 2004 (45% and 44% respectively). Among the Other ethnic group, the utilisation rate was steady over the 2002 to 2006 period.

Graph 57: Diabetes Management based on "Get Checked" programme utilisation



Improvement in diabetes management (2007) based on the reduction in number of people with HbA1C >8, showed no significant changes across the ethnic groups.

Table 142: Utilisation rate of Hb1AC by ethnicity in Waikato - 2007

Ethnicity	No. of People with >8 HbA1C	Waikato DHB Achieved	Waikato DHB Target
Maori	464	38%	38%
Pacific	92	46%	40%
All others	1108	22%	21%
Total	1664	26%	

One of the major issues with the Get Checked programme is the retention of diabetes patients, i.e return for a second or subsequent review. The findings from a retrospective review of Waikato Primary Health registered patients who had at least one "Get checked" review between 1st July 2000 and 30th June 2006 were⁷⁰:

- Younger patients aged <40 years, those of Maori or Asian origin and those with Type 1 diabetes were less likely to be retained in the programme with regular checks.
- The proportion of newly diagnosed patients among those attending their first review is unclear.
- Only 57% of the estimated diabetes patients (10,604) utilised the free check in 2004-05 and 2005-06 years.

⁷⁰ Joshy G, Lawrenson R, Simmons D. Retention of Patients in the "Get Checked" Free Annual Diabetes Review Program in New Zealand. NZ Med J 2008; 121(1270): U2945. URL: <http://www.nzma.org.nz/journal/121-1270/2945/>

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- In spite of this programme being of benefit and free to patients, the retention in the programme decreased rapidly with time.
- One and a half years after initial review (allowing a six month window to the ideal one year time frame between reviews), 35% of patients were yet to return for a second review. 15% had not come back for a second review for up to 5 years since the first review.
- Maori and Asians took a significantly longer time to return for a second review (1.4 years) compared with Europeans (1.1year).
- Younger patients aged <40 years returned for a second review much later (1.8 years) than 65+ year olds (1.1year)
- Those who attended a second review returned much earlier for the third review, 75% within 1.5 years after second review.
- Based on multivariate analysis, younger patients aged <40 years, those of Maori or Asian origin and those with type 1 diabetes were less likely to return for a second review.
- There were no significant gender differences in participation in the “Get Checked” programme.
- Better “cultural fit” between patient and caregiver, call/recall and more effective follow-up services may improve attendance by ethnic minorities.

The “Performance Audit Report” by the Controller and Auditor General⁷¹ of the Get Checked diabetes programme outlined the key findings following detailed analysis of the programme outcomes across Auckland, Counties Manukau, Tairāwhiti, Hawke’s Bay, Capital & Coast Health, and Otago District Health Boards and a selection of PHOs within these DHBs. The findings from the report are:

- Overall, the programme has improved certain aspects of diabetes management. However, there are some issues that need to be addressed for the programme to operate more effectively.
- Awareness of diabetes has heightened and monitoring of patients has improved;
- Guidance provided to GPs on diabetes treatment and referrals to specialist diabetes services has improved; and
- Innovative programmes to remove barriers for people accessing diabetes care, particularly Māori and Pacific Island peoples, are being used in some areas.

The issues that need to be addressed by the DHBs as outlined in the report are:

- DHBs need to identify the population eligible to participate in the programme (that is, those people diagnosed with diabetes) so that the programme’s coverage can be accurately assessed and progress towards targets can be measured with certainty.
- Information system problems that affect the integrity of the data in the diabetes register must be addressed.

⁷¹ Ministry of Health and District Health Boards: Effectiveness of the “Get Checked” diabetes Programme, Performance Audit Report, Wellington Office of the Auditor General, June 2007. Report available from the website: www.oag.govt.nz

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- DHBs need to carry out audits to ensure that general practices are preparing good quality treatment plans, in line with the relevant guidelines, and are giving the necessary support to patients so they can implement the plans.
- DHBs need to work with Local Diabetes Teams to collect data on specialist diabetes services and carry out supply and demand analysis to assess the adequacy of the services.
- DHBs need to carry out more cohort studies, using repeated measurement of people who have participated in the programme over several years, to identify how effective the programme is and how best to improve diabetes management.

Key findings from the Taumaranui study⁷² suggest that:

- the uptake of “Get Checked” programme seems to be governed by factors beyond financial barriers (69%).
- the non-attendance generally have lesser cardio vascular co-morbidities and are more like to be Maori.

9.21 Diabetes - Regional and Territorial Local Authority Perspectives - NZHIS

This section draws information from the “Population Health Planning Resource 2007-2012⁷³” report. In this report the mortality was calculated from 1999 to 2003 years.

Waitomo had the highest diabetes mortality rate (69) of all TLAs, followed by Waikato District (60). Matamata-Piako District had the lowest TA rate (31).

All the TLAs showed over five times the rates for Maori compared to non-Maori except Thames Coromandel which shows only three times the rate.

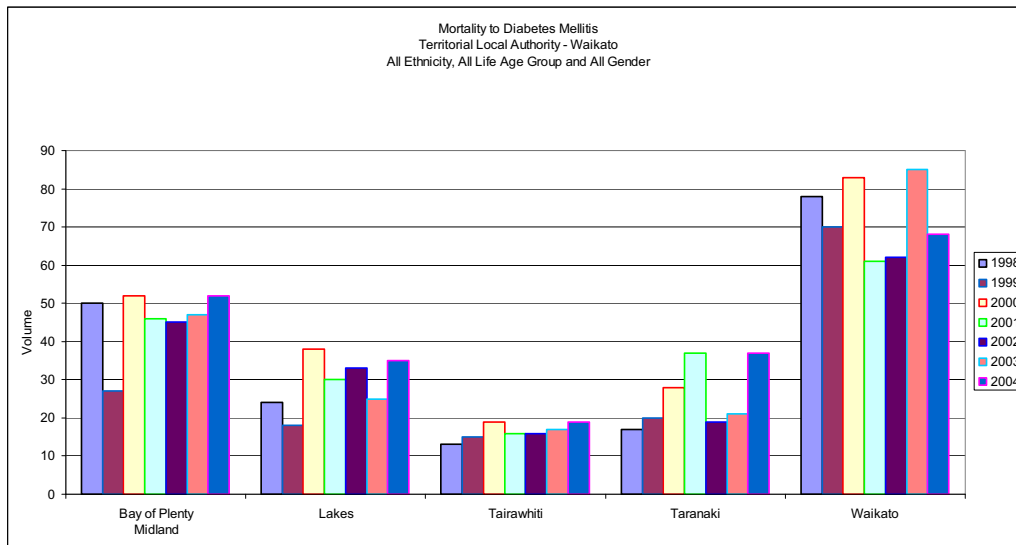
At a regional level, except Waikato, other Midland regions showed an increase in the number of deaths to diabetes.

⁷² Joshy G, Devers M, Simmons D. Patient Perspectives on Barriers to Diabetes Care in a Rural Town in New Zealand. In Conference Proceedings and Abstract Book. New Zealand Society for the Study of Diabetes 30th Annual Scientific Meeting. Palmerston North, 2006:59

⁷³ Prepared by Population Health Services, Health Waikato, Waikato DHB.

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Graph 58: Mortality to Diabetes 1998-2004 Midland Region



The age standardised rates of mortality to diabetes in the Midland region for 2003 and 2004 were:

Table 143: Age Standardised Rate of mortality to diabetes - Midland region rates compared to New Zealand rates

DHB Name	DHB Age Standardised Rates (per 100,000 Population)	Analysis Standard DHB Confidence Level (CL) Volume Per DHB Pop
Bay of Plenty	31.99	6.27
Lakes	46.09	12.41
Tairawhiti	60.68	21.1
Taranaki	32.88	9.01
Waikato	33.13	5.25

The age standardised rates of mortality in the Lakes and the Tairawhiti regions were the highest in the Midland region for 2003 and 2004. Any diabetes management programmes at the Midland regional level need to consider the additional services required in the Lakes and Tairawhiti areas.

9.22 National and Midland Regional Hospitalisation - NZHIS

In total there were 48,526 hospitalisations for diabetes mellitus in 2000 to 2006 years. Around 70% of the hospitalisation was related to non-insulin dependent diabetes.

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Table 144: Diabetes mortality - A National Perspective

Hospitalisation - Diabetes	2000	2001	2002	2003	2004	2005	2006	Total
E11 - Noninsulin-dependent diabetes mellitus	2004	3368	4673	5186	5731	6002	7177	34141
E10 - Insulin-dependent diabetes mellitus	1613	1906	2179	1917	1915	2143	2155	13828
E14 - Unspecified diabetes mellitus	26	29	35	47	68	60	59	324
E13 - Other specified diabetes mellitus	9	16	31	27	32	62	56	233
Grand Total	3652	5319	6918	7177	7746	8267	9447	48526

The New Zealand rate of hospitalisation for non insulin diabetes more than trebled from 2000 to 2006 while the rate for insulin dependent diabetes remained constant in proportion to the population.

The age standardised rate of hospitalisation for diabetes was the highest in Tairāwhiti at 60.68 per 100,000 followed by Lakes at 46.09 per 100,000 for 2005 and 2006 and the rates in these two regions were higher than the national rate.

9.23 Hospitalisation at Territorial Authorities Level

Table 145: Hospitalisations to diabetes by Territorial Authorities

Territorial Local Authorities - Diabetes Hospitalisation	2000	2001	2002	2003	2004	2005	2006	Total
Hamilton City	162	248	298	306	283	316	358	1971
Hauraki District	20	28	29	41	40	60	55	273
Matamata-Piako District	35	38	48	71	61	65	82	400
Otorohanga District	10	14	33	19	17	14	30	137
Ruapehu District	19	37	38	34	35	17	46	226
South Waikato District	32	52	58	45	61	55	99	402
Thames-Coromandel District	59	106	87	90	74	114	105	635
Undefined		1						1
Waikato District	46	62	77	82	80	81	103	531
Waipa District	50	69	94	103	91	104	102	613
Waitomo District	34	40	50	42	39	37	44	286
Grand Total	467	695	812	833	781	863	1024	5475

The following findings are extracted from the “Population Health Planning Resource 2006-2012” report (referenced above), and the hospitalisation rates were for the 2001 to June 2006 period.

Matamata-Piako District showed the lowest rate of hospitalisation, but the rates were three times higher for Waitomo and Part Ruapehu Districts.

Excluding Thames Coromandel, across the remaining TLAs the rate of hospitalisation for Maori was three times that of Non Maori.

Rate of hospitalisation among Maori in Waitomo District was 877 per 100,000 - five times the rate for the Waikato DHB in total.

9.24 Barriers to diabetes care

This summary is based on the postal survey “Barrier to Care” initiated in March 2005, including all known diabetes patients in Taumarunui, a rural Waikato town. The response rate was around 62%. Most frequently reported barriers to diabetes care were⁶⁷:

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Table 146: Barriers to diabetes care - 2005 survey information

Barrier	European N=116	Maori N=63	Other N= 25
No Symptoms Cue	97 (82.2%)	53 (84.1%)	17 (73.9%)
Lack of Public Awareness*	77 (65.3%)	51 (81.0%)	12 (52.2%)
Personal Finance	77 (65.3%)	49 (77.8%)	16 (69.6%)
Priority Setting*	61 (51.7%)	46 (73.0%)	11 (47.8%)
Public Health Belief*	19 (16.1%)	21 (33.3%)	5 (21.7%)
Service-Physical Access to Care*	14 (11.9%)	7 (11.1%)	7 (30.4%)

* Ethnic difference significant at 5% level.

- Three major barriers across all ethnic groups were: no symptom cue, lack of public awareness and personal finance.
- The rates of low diabetes knowledge and other health conditions were significantly higher among males.
- Unsatisfactory diabetes care/education is a significant barrier for insulin treated diabetes patients.
- Priority setting and public health belief were significant barriers for Maori compared with Europeans.

9.25 Risk Factors

Although the exact cause of type 2 diabetes, the most common type of diabetes, is not known, a number of risk factors have been identified.

- Diabetes occurs most often in adults older than 45, but it is appearing in much younger people.
- Weight, physical inactivity and race/ethnicity are common risk factors for developing type 2 diabetes, and there is evidence that diabetes runs in families, suggesting that genetics may play a role.
- A more aggressive treatment approach is needed to reduce the potential for complications from diabetes.

9.26 Conclusion

Effective management of diabetes requires a multi-disciplinary taskforce of diabetes experts from leading institutions and diabetes organisations, committed to improving treatment outcomes for people with type 2 diabetes.

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Enabling a dynamic link between the primary, secondary and tertiary health providers is urgently required, if the health sector and the DHBs are serious about reducing the incidence and impact of diabetes and its complications. Although high financial commitments are required for the communication links, the benefit realised from the long term positive health outcomes of the population is immeasurable.