

The demographics and prevalence of youth (15–24 year olds) with type 1 diabetes in the Canterbury District Health Board catchment area in 2010: has the prevalence changed since 2003?

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Abstract

Aim The aim of the present study was to provide up-to-date descriptive information in relation to youth (15–24 years) with type 1 diabetes, residing within the Canterbury District Health Board (CDHB) catchment area. This included calculating the prevalence of type 1 diabetes in youth, and investigating whether there was an increase in the prevalence since a previous study reporting the prevalence of type 1 diabetes in youth in the CDHB in 2003.

Methods Data were collected from multiple clinical and research sources. Descriptive information and demographic characteristics, including age, gender, ethnicity, deprivation level, and diabetes duration were gathered. The prevalence, stratified by age and ethnicity, was calculated using the 2006 population census data.

Results There were 248 people with type 1 diabetes aged between 15 and 24 years residing within the CDHB area at the time of present study, giving a prevalence of 426 per 100,000 European youth with type 1 diabetes. The prevalence is found to have increased by 45 per 100,000 (12%) since 2003, but was statistically insignificant.

Conclusions There was no statistically significant increase in the prevalence of type 1 diabetes in youth in the CDHB catchment area between 2003 and 2010. However, the absolute figures of adolescents and young adults with type 1 diabetes have increased, which implies an increased demand on health care associated with diabetes compared to 7 years ago.

Type 1 diabetes is the most common endocrine disorder in children and adolescents.¹ Type 1 diabetes in youth may have profound long-term complications, if poorly managed. Long-term complications may contribute to life-lasting disabilities and chronic diseases, such as blindness, kidney failure, nerve damage, circulatory problems, heart disease, and early death.^{2,3}

The onset of long-term complications can be prevented or delayed if good diabetes management is achieved,⁴ thereby reducing the costs for the individual and their family, and to the healthcare system.

The incidence and prevalence of type 1 diabetes is increasing nationally and internationally.^{5–7} For example, over a 30-year period in the Canterbury geographical region, the incidence of type 1 diabetes in children and adolescents (0–19 years) was found to have significantly increased with time.⁶

The incidence rate of type 1 diabetes over time was significant in children (0–14 year olds).⁶ Whereas there were insignificant changes in the rate of new presentations of type 1 diabetes with time in adolescents (15–19 year olds).⁶ The last study of the prevalence of type 1 diabetes in youth (0–24 year olds) in the Canterbury District Health Board (CDHB) indicated a prevalence of 227 per 100,000 population.⁸ The present study provides up-to-date data on the number and prevalence of youth with type 1 diabetes. The aims of this paper were to

- Describe the demographics of youth (15–24 year olds) with type 1 diabetes in the CDHB catchment area and to compare this data with previous research.⁸
- Calculate the prevalence of youth with type 1 diabetes in the CDHB catchment area.
- Investigate whether there has been an increase in the prevalence of youth with type 1 diabetes residing within the CDHB catchment area.

Methods

The study comprised two main phases – data collection and data analysis. The project involved collating information for youth with type 1 diabetes aged between 15 and 24 years, residing within the CDHB catchment area. This included Christchurch, the town of Ashburton, and Northern rural Canterbury. South Canterbury District Health Board (SCDHB) entries were excluded from the study.

The number of youth residing in the identified catchment area based on an anchor date of 1 November 2010 was calculated. This date was aligned with the previous study's anchor date,⁸ yielding a 7-year gap between the two studies.

The search criteria (i.e. valid entries) used in the previous study was followed.⁸ Thus, those with newly diagnosed and patients with secondary or type 2 diabetes were excluded from the study.

CDHB records were searched in multiple electronic and physical sources. The electronic data sources included the CDHB inpatient and outpatients lists; the Diabetes Youth Canterbury database; and records from the previous study.⁸

The data collected comprised descriptive information and demographic characteristics of the youth. This included gender, ethnicity, age, residential area deprivation level,⁹ and diabetes duration.

Missing data-point entries were updated by searching the physical files held at the CDHB Diabetes Centre based on the National Health Index (NHI), and contacting the individual youth's General Practitioner (GP).

The collated data was entered in raw format using Microsoft Excel 2007 and IBM Statistical Package for Social Sciences (IBM SPSS 19). These software packages were used in the first (data collection) and second (data analysis) phases of the study. Age data was divided into two age bands (15–19 years and 20–24 years), representing adolescents and young adult developmental stages.

In the second phase, the prevalence of youth with type 1 diabetes was calculated, and then this was compared to the results of the last audit's study that was conducted in the CDHB in 2003.⁸ In the present research, the prevalence calculation was based on the 2006 census data, whereas the 2003 prevalence calculation was based on the 2001 census data.¹⁰

Prior to comparing the two results, the studies populations were checked for adequate comparability. The checking for this revealed two potential points of difference. The first potential point of difference point was related to maintaining the unity of the source of the obtained census lists. It was established that both of the census population figures were drawn from the same source of either Total Responses or Prioritised lists.¹¹

The second point was related to the different data collection and entry system of the 2001 and the 2006 census. For example, the 'New Zealander' entry was grouped with the European entry in the 2001 census data; however, in 2006 a separate classification under 'other ethnicities' was created to sum the New Zealander entries.¹¹ To overcome this issue, the total number of the New Zealander subcategory

in the 2006 census data was added to total number of the European category, thus making the 2001 and 2006 census population totals comparable to each other.

After ensuring the populations comparability, the 2010 and 2003 prevalences were compared. This process involved calculating the difference between the prevalences, and the 95% confidence interval (CI) of this difference.¹²⁻¹⁴ This difference was then statistically tested for significance.¹²⁻¹⁴

Results

The number of youth with type 1 diabetes residing within the CDHB catchment area on the anchor date 1 November 2010 was 248. The demographics of these youth are depicted in Table 1.

Table 1. Demographics of youth with type 1 diabetes, who are residing within the CDHB catchment area in 2010

Variables		Count	N%
Gender	Female	120	48.4%
	Male	128	51.6%
Age groups* (years)	(15–19)	131	52.8%
	(20–24)	117	47.2%
Ethnicity	European	227	91.5%
	Maori	9	3.6%
	Pacific Peoples	3	1.2%
	Other	9	3.6%
Diabetes duration** (years)	between 1 and 5	55	22.2%
	between 6 and 10	82	33.1%
	between 11 and 15	68	27.4%
	between 16 and 20	33	13.3%
	more than 20	10	4.0%
Deprivation quintiles (1 = least deprived areas)	1	77	31.2%
	2	55	22.3%
	3	55	22.3%
	4	35	14.2%
	5	25	10.1%

* Mean age was 19.2 years old (standard deviation (std. dev.) =2.6 years)

** Mean length of diagnosis was 10 years (std. dev. =5.4 years; minimum =0.9 year (11 months); maximum=22 years). The prevalence calculation only included entries of established diabetes. This included diabetes duration that is around 1 year or more.

Based on the total number of youth with type 1 diabetes residing within the CDHB catchment area in 2010, the prevalence was calculated using the 2006 census data.¹⁰ The calculation was stratified according to ethnicity. Additionally, the European ethnic group had sufficient numbers to allow for the stratifying of data into two age bands (15–19 years and 20–24 years), which correspond to the census age categories. The results are shown in Table 2.

Table 2. Number and prevalence of European New Zealanders with type 1 diabetes (stratified by age) residing in the Canterbury District Health Board Catchment Area in 2010 and 2003

Anchor date	(15–19 years old)	(20–24 years old)	Total
1 November 2010			
Number	126	101	227
Prevalence per 100,000	443	406	426
(95%CI X to Y)	(372 to 527)	(334 to 493)	(374 to 484)
Total population ¹⁰	28,452	24,891	53,343
Anchor date	(15–19 years old)	(20–24 years old)	Total
1 November 2003			
Number ⁸	92	95	187
Prevalence per 100,000	369	394	381
(95%CI X-Y)	(301 to 452)	(322 to 481)	(330 to 440)
Total population ¹⁵	24,951	24,126	49,077

The total prevalence from the present study was compared with the prevalence obtained by the previous study (Table 2),⁸ after ensuring the comparability of data as previously described. The comparison yielded an increase of 45 per 100,000 (12%) population. However, the 95% confidence interval for this prevalence difference ranged from -33 to +122 indicating that this increase was not statistically significant.

From 2003 to 2010 there was a prevalence increase of 74 per 100,000 (20%) in adolescents (15 to 19 year olds), and 12 per 100,000 (3%) in young adults (20 to 24 year olds) with type 1 diabetes. However, the prevalence increase was statistically insignificant in each age band, from 2003 to 2010, according to the confidence interval of the difference: (95%CI -35 to 182) and (95%CI -101 to 125) per 100,000 adolescents and young adults, respectively.

Comparing the total populations in Table 2 suggests that the adolescents' age band had an increase of 14% compared to a 3% increase in the young adults' total population. Additionally, the number of adolescents (15–19 year olds) with type 1 diabetes exceeded the number of young adults (20–24 year olds) with type 1 diabetes by 25% in the present study. This is in contrast to the previous study,⁸ where the young adults' population was slightly (3%) larger.

Discussion

Type 1 diabetes is a chronic illness that is associated with multiple challenges. In addition to the patient's diabetes-management challenges, there are challenges for the health system. These include the planning and accessibility of resources, such as medication, equipment, and access to appropriately trained healthcare professionals. Moreover, additional health costs stem from long-term complications associated with poorly-controlled type 1 diabetes, such as kidney failure and nerve damage.

The burden on the health system is greater if these long-term complications arise at an early age. Thus, it is important for health care planning to gather data on the demographics, prevalence and trends of diabetes in specific populations, such as the youth population.

The present study aimed to gather this data for youth (15–24 year olds) with type 1 diabetes residing within the CDHB catchment area. The results indicate that the majority of CDHB youth who have type 1 diabetes were European New Zealanders, with males slightly outnumbering females.

These results are similar to the previous study.⁸ However, in the present study, the number of adolescents (15–19 year olds) with type 1 diabetes was greater (by 25%) than the number of young adults (20–24 year olds) with type 1 diabetes. Whereas, in the previous study,⁸ the difference was 3% in favour of the young adults population.⁸

This difference may be explained by a 14% increase in the total population of the adolescents in the CDHB catchment areas according to the 2006 census data, compared to only a 3% increase in the young adults' total population.

The total prevalence of CDHB youth with type 1 diabetes was increased by 45 per 100,000 (12%) from the previous audit,⁸ but was not statistically significant. This result is similar to the results of a previous study for the age range of 15 to 19 years old.⁶ The prevalence in the present study was greater in each age band; however, this was not statistically significant.

The prevalence increase in adolescents was greater than that of young adults. Again, this increase could be expected given the increase in the overall adolescent population from the 2001 to 2006.^{10,15} That is, according to the 2006 census there was a greater number of adolescents residing in the CDHB catchment area overall, when compared to the 2001 census, which in turn is likely to result in a greater number of adolescents with type 1 diabetes.

The results also indicated that a high percentage of youth with type 1 diabetes in the CDHB catchment area resided in the least deprived areas (53.5% in deprivation quintiles 1 and 2). This result may simply be representative of the wider Canterbury population. That is, youth of European descent in Canterbury (which includes most of the cases of youth with type 1 diabetes in this region) may be more likely in general to reside in least deprived areas.

Without further indepth analysis to calculate the estimated prevalence of the CDHB youth residing in the different deprivation quintiles, and linking of residential mesh blocks to the different deprivation levels specific to the CDHB area and the youth population in the target age range (which were not possible in the current study), it is not possible to determine if this is a statistically significant result. It is, therefore recommended that future research explores this finding in more depth.

It should be noted that the present study may not have identified all youth with type 1 diabetes within the CDHB catchment area. That is, there may be missing entries, which could have been checked using additional capture-recapture methods. Capture-recapture was applied in the present study using the previous study records.⁸

Another limitation to the study is the search date that was used to download records. This was set to about 1 year prior to the anchor date, and included the month of December 2010. It is expected that youth with diabetes get checked at least once a year. However, records may be missed if they have not attended their annual check in 2010. More entries may have been captured, if the search period was extended to, for example, 2 years from the anchor date.

Although the aforementioned limitations may have resulted in missing entries, the number of missing entries is believed to have been minimised because multiple sources were checked for youth entries, including the inpatient and outpatient hospital discharges and youth databases.

Additionally, the composition of demographic factors for youth with type 1 diabetes in the present study (e.g. the 91.5% Europeans, and 48.4% female and 51.6% males), were similar to the total CDHB youth population according to the 2006 census. For instance, according to the 2006 census records, the total population of European youth in the CDHB was 83% and the percentage of males was higher than females.¹⁰ Hence, this gives confidence that the results of the present study are an accurate representation of youth with type 1 diabetes in the CDHB catchment area.

To conclude, the absolute figures obtained in the present study suggest an increased demand on health care resources associated with youth with type 1 diabetes compared to 7 years ago.

It is recommended that the results from the present study be used to inform planning and decision-making related to diabetes health services both in the short and longer term. For example, if youth receive and engage in adequate health services in the short term, this may delay or prevent the onset of long-term complications, and therefore reduce future health care costs.

Competing interests: None.

Ethical approval: The study was reviewed and approved by Te Komiti Whakarite (CDHB Research Consultation with Maori). Additionally, the study was reviewed and approved by the University of Canterbury Human Ethics Committee (HEC 2010/183).

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