Chapter 4

ETHNICITY, IMMIGRATION & Diabetes

INSIDE
Highlights
Introduction
List of Exhibits
Exhibits and Findings
Discussion
Conclusions and Implications
Appendix 4.A: Research Methodology
References

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HIGHLIGHTS

Issue
• Type 2 diabetes occurs more commonly in non-European ethnoracial groups. This is due, in part, to differing genetic susceptibility to diabetes across various ethnic groups.
• Nearly 50% of the Peel population is comprised of immigrants to Canada. A large proportion of this population belongs to ethnic groups that experience a higher risk of developing diabetes compared with other ethnic groups.
• This chapter presents the spatial distribution of ethnoracial and immigration characteristics of Peel residents, and the association of these characteristics with rates of diabetes.

Key Findings
• Although settlement patterns differed by ethnic group, census tracts with higher proportions of South Asian and Black visible minorities, as well as those with higher proportions of recent immigrants, also had higher rates of diabetes.
• Areas with a large proportion of the population not speaking English also tended to have high diabetes rates, particularly in Brampton.

Implications
• Strategies to reduce the risk of diabetes in high-risk communities need to consider the underlying ethnicity and culture of the target population.
• Diabetes programs need to be culturally appropriate and accessible to groups for whom English is not their first language.

INTRODUCTION
Type 2 diabetes occurs more commonly in non-European ethnoracial groups, largely due to ethnic differences in genetic susceptibility. The highest rates of diabetes worldwide have been reported in Aboriginal populations, including those in Canada. In these populations, the prevalence of diabetes may be as high as 20% to 50%. Other groups with a higher prevalence of diabetes, both in indigenous and immigrant populations, include people of South Asian, African and Hispanic ethnic background.

In the United States, the prevalence of diabetes in African- and Hispanic-Americans, and South Asians, is twice that of non-Hispanic Whites. In England, people from Black Caribbean, Indian, Pakistani and Bangladeshi ethnic groups have three to six times higher prevalence than the general population. In Canada, people of South Asian descent are three to five times more likely to have diabetes than the White population. In Ontario, South Asians and West Asians comprise 12% of the population with diabetes despite representing less than 4% of the overall population. Although not as high as in those born in South Asian countries, Ontario residents born in Africa, the Caribbean and the Middle East have higher rates of diabetes compared with the general population and immigrants from western European countries.

Ethnicity alters the risk of diabetes through genetic factors that are not completely understood. Obesity is known to be one of the most important risk factors for the development of diabetes. Genetics can influence a person’s propensity to gain weight, where the weight is gained in the body, the likelihood that increased body fat will result in insulin resistance and the age at which diabetes develops. Studies looking at people of Western European, African and South Asian ancestry have found that obesity is significantly more common in people of European and African ancestry, while rates of diabetes are higher among South Asians. Although obesity levels were found to be similar in the population of European and African ancestry, diabetes rates were higher in African ethnic populations. In addition, diabetes risk is significantly higher at lower body weights and lower waist circumferences for South Asians, as compared with people of European or African ancestry (for more information on patterns of overweight/obesity and diabetes prevalence, see Chapter 2). These results suggest that the relationship between obesity and diabetes may differ across ethnoracial groups.
Programs aimed at preventing diabetes need to consider that standard body weight guidelines may not be appropriate in an ethnically-diverse population. The propensity for weight gain and subsequent development of pre-diabetes or diabetes are also impacted by social and environmental factors.

Immigration largely affects the epidemiology of diabetes in the overall population through changing the ethnic composition of the community. Risk seems to increase as immigrants become more affluent and move to urban centres. This phenomenon has been observed in migrants from rural to urban areas within the same country, and in migrants moving from less industrialized and urbanized countries to those that are more so.\(^6\),\(^{17}\) Migration may influence the risk of diabetes through nutrition transition (i.e., a move from a diet rich in fruits and vegetables to a Western diet rich in fats, meat, processed foods and salt), changes in physical activity levels and stress.\(^{17}\) The relationship between migration and socioeconomic status is further complicated by the fact that although migrants may move from less affluent to more affluent countries, recent immigrants themselves often experience a drop in socioeconomic position relative to the native-born population in the first years after migration. Differences in socioeconomic status may compound the higher risk of diabetes among certain ethnoracial and immigration groups.\(^{18}\) Recent immigrants and visible minorities in Canada tend to have lower incomes than Canadian-born individuals of European descent and this may exacerbate health disparities.\(^{19},^{20}\) There is also evidence that recent immigrants and visible minorities have poorer access to health services, which may negatively impact the quality of diabetes care they receive.\(^{21},^{25}\)

Peel is a highly culturally and ethnically diverse region. In 2006, one-half (50%) of Peel residents overall identified themselves as being from a visible minority (57% in Brampton, 49% in Mississauga and 7% in Caledon; see Chapter 1).\(^{26}\) In addition, immigrants comprise 28% of the total Ontario population, but nearly half of the Peel population (48.6%).\(^{26}\) The majority of recent immigrants to Canada (and Peel) originate from non-European countries.\(^{27}\) Thus, many of these groups are genetically more susceptible to
developing diabetes. The purpose of this chapter is to examine the relationship between the prevalence of diabetes and recent immigration and ethnicity in Peel. The ethnic composition of Peel is extremely heterogeneous. Therefore, for the purpose of the analyses in this chapter, the top five self-identified, visible minority ethnic groups (South Asian, Black, Chinese, Filipino and Latin American) and the top three self-identified, non-visible minority ethnic groups (Italian, Portuguese, Polish) from the 2006 census were identified (see Appendix 4A).

LIST OF EXHIBITS

Exhibit 4.1 Visible minorities (self-reported) as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region

Exhibit 4.2 South Asian visible minorities (self-identified) as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region

Exhibit 4.3 Black visible minorities (self-identified) as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region

Exhibit 4.4 Chinese visible minorities (self-identified) as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region

Exhibit 4.5 Filipino visible minorities (self-identified) as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region

Exhibit 4.6 Latin American visible minorities (self-identified) as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region

Exhibit 4.7 People of Italian ethnic origin (self-identified) as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region

Exhibit 4.8 People of Portuguese ethnic origin (self-identified) as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region

Exhibit 4.9 People of Polish ethnic origin (self-identified) as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region

Exhibit 4.10 People who immigrated to Canada as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region

Exhibit 4.11 People who immigrated to Canada between 1996 and 2006 as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region

Exhibit 4.12 People not speaking English or French as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region

Exhibit 4.13 Spatial relationship between visible minorities (self-reported) as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rate-ratios*, by census tract [2006], in Peel region

Exhibit 4.14 Spatial relationship between immigrants to Canada, as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rate-ratios*, by census tract [2006], in Peel region
Findings:

- Peel is home to a large visible minority population. Census tracts (CTs) with higher percentages of visible minorities (60.1%–92.1%) were found in central, west and northeast Mississauga, as well as southwest, northwest, north and east Brampton. Caledon had the lowest proportion of visible minority populations.

- CTs with high prevalence of diabetes (11.9%–14.3%) coincided with areas that had a high concentration of visible minority residents both in Brampton and Mississauga.
Findings:

- Both Mississauga and Brampton had many census tracts (CTs) with high percentages of South Asian visible minorities (more than 30% of the total CT population).

- CTs in the southwest, east and north areas of Brampton, and in central and northeast Mississauga had the highest percentages of South Asian residents (40.1% – 77.3%).

- With few exceptions, high diabetes prevalence rates (11.9% – 14.3%) were found in CTs with high concentrations of South Asian residents (30.0% – 77.3%).
Findings:

- Many areas scattered across Brampton had census tracts (CTs) with high percentages of individuals (compared with the rest of Peel) self-identifying as belonging to Black visible minority groups (9.1%–24.4%). Mississauga had few areas with similar concentrations, except in the northeast region.

- Caledon had low percentages of Black visible minority populations.

- Many CTs in Brampton with the highest percentages of Black visible minorities (12.1%–24.4%) also had high rates of diabetes, particularly in the north, east, southwest and parts of central Brampton. Less of a pattern was observed in Mississauga, except in the northeast. Many of these areas were also found to have high percentages of South Asian populations [Exhibit 4.2].

Exhibit 4.3. Black visible minorities (self-identified) as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region
Findings:
• While South Asian and Black visible minority populations were most highly concentrated in Brampton (see Exhibits 4.2 and 4.3), the highest percentages of Chinese visible minorities (6.6%–21.9%) were present in Mississauga, predominantly in the central region.
• Neither Brampton nor Caledon had significant Chinese visible minority populations.
• There was no clear correspondence between percentage of people of Chinese ethnicity and rates of diabetes prevalence in Peel.
Exhibit 4.5. Filipino visible minorities (self-identified) as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region

Findings:

• Similar to the distribution of people of Chinese ethnicity (Exhibit 4.4), people of Filipino ethnicity in Peel largely resided in Mississauga, particularly in the central, west and north regions.

• Some census tracts (CTs) with higher Filipino concentrations were also scattered throughout Brampton, particularly in the northwest and southwest regions. Caledon had very low percentages of people of Filipino ethnicity.

• There was no clear association between percentage of people of Filipino ethnicity and diabetes rates in Peel.
Findings:

• People belonging to Latin American visible minority groups represented a very small proportion of the overall population in Peel (up to a maximum of 10.0% in one census tract (CT)).

• CTs with higher concentrations (relative to the rest of Peel) were found in central, west and northwest Mississauga, and southwest, northwest and central Brampton (2.6%–10.0%).

• There was no apparent pattern in the distribution of Latin American minorities and diabetes prevalence rates in Peel.
Findings:

- After British, people of Italian ethnic origin comprised the largest non-visible minority ethnic group in Peel (8.1% overall), followed by Portuguese and then Polish (shown in subsequent maps).

- The highest percentages of people of Italian ethnicity (25.1%–59.0%) were found in Caledon, particularly in east Caledon as well as northeast Brampton. Some census tracts (CTs) in east Mississauga also had higher percentages of people of Italian ethnic background (15.1%–25.0%).

- In general, CTs with the highest percentages of people of Italian ethnicity had lower diabetes prevalence as compared to other Peel CTs.
Findings:

- In 2006, people of Portuguese ethnic origin comprised the third largest non-visible minority ethnic group in Peel (5.1% of the overall population).

- Higher percentages of people of Portuguese ethnicity (6.6%–16.3%) were found in west and northwest Brampton, and parts of central and east Mississauga.

- In Mississauga and Caledon, census tracts (CTs) with higher percentages of people of Portuguese ethnicity had lower diabetes prevalence compared to the rest of Peel; however, in Brampton, areas with higher percentages of Portuguese populations had higher rates of diabetes.
Exhibit 4.9. People of Polish ethnic origin (self-identified) as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region

Findings:

- People of Polish ethnic origin comprised the fourth largest non-visible minority ethnic group in Peel (4.8% overall).

- Mississauga had the largest percentage of people of Polish ethnicity with higher percentages (6.1%–15.4%) found in the east, south and southeast. West Brampton and two census tracts (CTs) in Caledon also had higher percentages of people of Polish ethnicity.

- In general, CTs with higher percentages of people of Polish ethnicity had lower or mid-range diabetes prevalence rates (compared with the rest of Peel).
Findings:

- In 2006, Peel was home to a large immigrant population. The proportion of Peel’s population born outside of Canada was 48.6% (51.6% in Mississauga, 47.8% in Brampton and 20.8% in Caledon).

- In a large proportion of census tracts (CTs) throughout Mississauga, immigrants made up more than 50% of the population, with the exception of the CTs to the south bordering Lake Ontario. Brampton had large percentages of immigrants in the north, east and southwest areas. Caledon had a comparatively small immigrant population.

- In general, CTs with the highest percentages of immigrants had higher diabetes prevalence compared with the rest of Peel.
Findings:

• The total percentage of the Peel population that immigrated to Canada between 1996 and 2006 was 18.5% (20.2% in Mississauga, 17.9% in Brampton and 1.9% in Caledon).

• In many census tracts (CTs) throughout Mississauga, with the exception of the south region that had lower rates, recent immigrants accounted for more than 20% of the total population. South Mississauga was also more affluent compared with the rest of Peel (see Chapter 3). In Brampton, CTs in the north, east, and southwest areas had the highest concentrations of recent immigrants. Caledon had very low levels of recent immigration.

• In general, Peel CTs with high percentages of recent immigrants had higher diabetes prevalence as compared to the rest of Peel.

Exhibit 4.11. People who immigrated to Canada between 1996 and 2006 as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rates per 100 persons aged 20+ [2007], by census tract [2006], in Peel region.
Findings:

- Northeast Mississauga and southwest, north and east Brampton were home to the highest percentages of residents (8.1-12.3%) who did not speak English or French.

- With only one exception, census tracts (CTs) with the highest percentages of people not speaking English or French also had the highest rates of diabetes.
Findings:

- In Brampton and Mississauga, most census tracts (CTs) with high rates of diabetes (at least 20% above the GTA rate of 9.0%) also had a high percentage of visible minorities (60.0–92.2%).

- All CTs in Peel with lower rates of diabetes (at least 20% below the GTA rate) had low percentages of visible minorities.
Findings:

- In Mississauga, with the exception of one census tract (CT), all CTs with high rates of diabetes (at least 20% above the GTA rate of 9.0%) also had the highest percentage of immigrants (55.0% or more).

- In Brampton, there was more variation. However, all but three of the high-diabetes CTs also had an immigrant population of at least 40%.

- Few CTs in Mississauga or Brampton had low rates of diabetes (at least 20% lower than the GTA rate); however, all low-diabetes areas also had the lowest percentages of immigrants relative to other areas of Peel.

Exhibit 4.14. Spatial relationship between immigrants to Canada, as a per cent of the total population [2006] and age- and sex-standardized diabetes prevalence rate-ratios* [2007], by census tract [2006], in Peel region.
DISCUSSION

The analyses in this atlas showed a strong concordance between the ethnic composition of Peel census tracts and diabetes prevalence. In Peel, South Asians comprised the most prominent visible minority group, followed by Blacks. Brampton had many census tracts with high rates of diabetes (11.9% to 14.3% as compared with the GTA average of 9.0%), as well as a higher percentage of the population belonging to a non-White ethnoracial group, particularly South Asian and Black. Similar to Brampton, Mississauga had a large South Asian population, but was also home to a significant percentage of people of Chinese and Filipino ethnicity. Areas in both Brampton and Mississauga that had large percentages of visible minorities also had high percentages of immigrants, particularly recent immigrants (i.e., people who immigrated between 1996 and 2006). Caledon had low rates of diabetes in conjunction with a low percentage of visible minorities and a low percentage of immigrants. Caledon had a relatively high proportion of people of Italian, and to a lesser extent, Portuguese and Polish ethnicity.

Ethnicity, immigration and diabetes

The concordance observed between the proportion of visible minorities or immigrants and diabetes prevalence is largely driven by patterns of increased immigration from non-European countries over the last 20 years. In 2009, 69% of all immigrants to Canada came from Asia, Africa or the Middle East. As discussed in the introduction, people of South Asian, African and Caribbean origin have a higher risk for diabetes. South Asians, in particular, have very high rates of diabetes regardless of whether they reside within their birth country or are external migrants from the region. For South Asians, this increased risk of developing diabetes begins at an earlier age, at a lower body mass index and with a smaller waist circumference. Developing diabetes at an earlier age further increases the burden of disease in this group by increasing the lifelong risk of complications related to diabetes (for more information, see Chapters 1 and 2). In 2006, South Asians comprised 24% of the total Peel population.

Although many chronic conditions occur less frequently in recent immigrants (a phenomenon described as the “healthy immigrant effect”), the prevalence of diabetes is higher in specific immigrant groups including people of South Asian, African and Caribbean origins. It should be noted, however, that diabetes rates vary considerably across immigrant groups and immigrants from Western and Eastern Europe, and East and Central Asia have relatively low rates of diabetes compared with both other immigrant groups and the general Ontario population. Not only are certain groups at increased risk, but the health of recent immigrants also tends to decline over time. Studies show that the body weight of many immigrants increases after only 10 years of residence in the new host country. As immigrants adopt a typical North American or Western diet high in saturated fats, red meats and "junk food", this may accelerate the development of insulin resistance and diabetes in these groups. The psychological stress of settlement can lead to unhealthy eating habits and may even directly increase the risk for developing diabetes.
Thus, diabetes programs should be geared towards newcomers taking into consideration ethnicity, period of immigration and factors related to the immigration experience.

Language barriers, socioeconomic status and diabetes

In Peel, a number of areas that had high percentages of recent immigrants and visible minorities at high risk of developing diabetes (particularly in Brampton and north Mississauga) also had higher rates of people with no knowledge of Canada’s official languages and lower socioeconomic status (SES) (for more information, see Chapter 3). Education and income are important factors that influence the health of high-risk populations and their ability to access appropriate health care services. The SES of many recent immigrants is complex as they tend to have high educational attainment, but low income, when first arriving in Canada. New immigrants may be less able to navigate the health care system or advocate for their health needs, which may result in poorer access to diabetes prevention and management programs.\(^24, 34\) Language may serve as an additional barrier to accessing medical care and local resources.\(^35\)

The clustering of low SES and high rates of recent immigration in some of the same areas makes it difficult to separate the effects of these two factors in those neighbourhoods. Ethnic enclaves may be advantageous because they give individuals more access to culturally-appropriate and familiar foods, and provide other pertinent cultural resources; however, neighbourhoods that are home predominantly to low-income or marginalized groups, including recent immigrants, can discourage healthy lifestyle choices through a lack of attractive and safe environments for physical activity and ready access to unhealthy foods.\(^36, 37\) These environmental factors may compound the risk for diabetes in genetically susceptible individuals.

Not only are certain ethnic and socioeconomic groups more likely to develop diabetes (see also Chapter 3), but the consequences of developing diabetes may be particularly difficult for socially disadvantaged groups. Effective management of diabetes requires good access to primary care, regular specialist visits and, often, adherence to a complex medication schedule. Poorly controlled diabetes often leads to adverse health outcomes including cardiovascular disease, amputations and death.\(^38, 39\) There are known racial differences in diabetes management and risk of health problems related to diabetes in the U.S.\(^23, 40-44\) In Canada, the relationship between ethnicity, language and diabetes management is less clear. One study found that there was no significant difference between use of primary or specialist care by South Asians and Blacks as compared with the general population; however, these ethnic minorities were less likely to receive eye exams.\(^19\) Gucciardi and colleagues (2007) found that non-English speaking patients were more likely to follow a diabetes self-management programs than English speaking Canadians when culturally- and language-appropriate resources were available.\(^45\) Unfortunately, health information and services that are sensitive to a range of cultures, faiths and languages are often not available, which promotes inequities in access to health services and quality of medical care for a number of groups. Therefore, not only are diabetes prevention strategies important in high-risk populations, but investment in diabetes management programs for these same groups and neighbourhoods is also essential to improve individual outcomes.
Study limitations

Important limitations of these analyses deserve mention. Firstly, the analysis used health claims data to identify individuals who had been already diagnosed with diabetes by a physician. Thus, the rate of diabetes among new immigrant groups may be underestimated because individuals who experience barriers to accessing medical care, including those who may not yet be eligible for provincial health insurance, may not have had the opportunity to be diagnosed. Additionally, this analysis focused only on people with existing diabetes (i.e., prevalence) and did not attempt to identify new diagnoses of diabetes (i.e., incidence). Therefore, cause-and-effect or the exact time sequence of events (i.e., whether individuals had diabetes before they moved to an area or whether they developed it afterwards) cannot be inferred. Finally, this study only used area-level information about immigration and ethnicity. So although it can be observed, for example, that areas with high percentages of recent immigrants also had high rates of diabetes, the immigration status or ethnoracial background of the people with diabetes in census tracts cannot be inferred.

It should also be noted that the diabetes age- and sex-adjusted prevalence ranges found on the maps span a large spectrum of risk and it could be argued that even the lowest risk category contains a moderate diabetes burden. For example, the lowest diabetes prevalence group (4.7%–8.7%) overlaps the overall Ontario prevalence of 8.3%. Similarly, the middle prevalence group (8.8%–11.8%) spans both the overall GTA and Peel rates of 9.0% and 10.0%, respectively. What can be said, however, is that the highest prevalence group (11.9%–14.3%) truly does represent a high burden of diabetes where as many as one-in-seven people in these areas have been diagnosed with diabetes by a physician.

CONCLUSIONS AND IMPLICATIONS

Peel is home to a large visible minority population, particularly individuals of South Asian heritage. There was a strong relationship between diabetes, immigration (especially recent immigration) and visible minority status, particularly for South Asian and Black populations in Peel census tracts. This relationship was most evident in the high-diabetes areas in west, central and northeast Mississauga, as well as east, central-west, north and northeast Brampton, areas that are home to high concentrations of visible minorities and recent immigrants. One issue of concern was the high proportion of residents who did not speak English in areas with high rates of diabetes. Language-specific services and information should be provided in these areas.

The findings in this chapter suggest that local policymakers and planners need to take genetic, cultural and language issues into account when devising community-based interventions, prevention programs and health services aimed at reducing the burden of obesity and diabetes. There is evidence that maintaining a more traditional pattern of diet and increasing physical activity can reduce the development of obesity and diabetes in high-risk ethnoracial migrant groups. It is important to take into account the genetic susceptibility of certain ethnic groups to
developing diabetes even at lower body weights and younger ages, suggesting that “one-size-fits-all” prevention programs may not be appropriate. Interventions to improve diabetes control in low income and ethnoracial minority groups also need to be tailored to individual, family and community needs. Future research in this area could help to guide interventions that support health equity.

APPENDIX 4.A – RESEARCH METHODOLOGY

Data Sources
- Immigration, knowledge of official language and visible minority status of Peel residents were abstracted at the census tract level from the 2006 Census of Canadian Census using standard definitions created by Statistics Canada.
- For this analysis, ethnic groups were defined based on the visible minority populations to which people self-identified. The proportion of the population that belonged to the top three non-visible minority ethnic groups (after United Kingdom countries) was derived from the ethnicity question on the Census asking what were the ethnic or cultural origins of respondents’ ancestors.
- Age- and sex-adjusted diabetes rates per 100 adults aged 20 years or older were calculated using the Ontario Diabetes Database and other administrative data sources held at the Institute for Clinical Evaluative Sciences (ICES) (for a detailed description of the data sources of diabetes rates, please refer to Appendix 2.A in Chapter 2).

Definitions
- An immigrant is defined by Statistics Canada as a person born outside of Canada who has been granted the right to live in Canada permanently by immigration authorities. Recent immigration refers to those who gained immigrant status in the preceding 10 years (i.e., between 1996 and 2006).
- Statistics Canada defines visible minorities as “persons, other than Aboriginal persons, who are non-White in race or colour,” in accordance with Canada’s Employment Equity Act.

Analysis
Bivariate maps were created to display the spatial relationship between immigration, language and ethnicity variables and rates of diabetes. Choropleth (shaded) maps were produced for each immigration, language and ethnicity variable. The classification ranges for each of the variables shown on these maps were determined using natural breaks in the distribution of the data, a common classification method for choropleth mapping. Diabetes rates were depicted in three categories using proportional circles. The ranges for these categories were determined by first ordering the population-weighted diabetes rates of all Peel census tracts from lowest to highest and then selecting the four points that divide the rates into five equal groups (quintiles). Each category of diabetes rates was depicted using proportional circles. Three different circle sizes were used to correspond to the magnitude of diabetes rates (i.e., larger circles correspond to progressively higher ranges of diabetes rates). The lowest category of diabetes rates consisted of the first (lowest) quintile and the highest category consisted of the last (highest) quintile. The middle category of diabetes rates was made up of the middle three quintiles grouped together. These circles were overlaid on top of the choropleth maps of immigration, language and ethnicity variables. This was done so that the reader could observe whether there is a spatial correspondence between, for example, areas with higher diabetes rates and higher percentages of recent immigrants. For the visible minority maps, 2006 Census data were examined for Peel and the top five visible minority groups that represented the largest proportion of residents in Peel were presented. The same method was used to identify the top three non-visible minority ethnic groups (excluding those of ‘British’ ethnic ancestry).
A second type of map for the immigration and visible minority (all) variable was created in order to highlight areas of Peel where diabetes rates were substantially higher or lower than the overall prevalence rate in the Greater Toronto Area (GTA). The overall GTA diabetes rate was 9% (nine cases per 100 adults aged 20 years or older). For each Peel census tract, the diabetes rate was divided by the GTA rate in order to calculate a rate-ratio. Census tracts with diabetes rates at least 20% higher than the GTA rate (rate-ratio of ≥1.2) and census tracts with rates at least 20% lower than the GTA rate (rate-ratio of ≤ 0.8) were shaded in different colors according to ranges of values of the immigration or visible minority (all) variable. All census tracts whose rates did not differ substantially from the GTA rate (rate-ratio between 0.81 and 1.19) were depicted using a single grey colour.

REFERENCES


19. Statistics Canada - 2001 Census. GO0528 Table 1: Population 15 Years and Over by Gender (3), Highest Level of Schooling (3), Home Language Spoken Most Often (5), Immigration Status/Period of Immigration (7), Visible Minority Status (6), and Income Statistics (2) for Canada, Selected Provinces, the Atlantic Region, and Census Tracts in the 18 Largest CMAs and Tracted CAs, 2001 Census, 20% Sample-based Data. Ottawa; 2004.


33. Raphael D, Anstice S, Raine K, McGannon KR, Rizvi SK, Yu V. The social determinants of the incidence and management of type 2 diabetes mellitus: are we prepared to rethink our questions and redirect our research activities? Int J Health Care Qual Assur. 2003;16(3)


