Chapter 9

KEY ISSUES and Opportunities

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KEY ISSUES

Context

Peel region is the second fastest growing region in the Greater Toronto Area (GTA). Compared with the GTA and the rest of Ontario, Peel region has a younger population, fewer people living alone, more persons who self-identify as belonging to a visible minority and much higher levels of immigration. Between 2001 and 2006, the majority of new residents settled in the recently developed outlying areas of Brampton and Mississauga, and high rates of development continue today. Peel region is also a major transportation hub, home to the country's largest airport and crossed by many busy arterial roads including several of the 400-series expressways. It has a few areas of concentrated population, particularly near Mississauga City Centre and in downtown Brampton, but much of the region is characterized by low population density and suburban planning standards that separate residential areas from retail and commercial services. This suburban design is strongly associated with car use and does not readily lend itself to active transportation such as walking or bicycling. At the same time, much of the recent immigration to Peel has been from regions of the world with rising levels of obesity and type 2 diabetes. Genetic predisposition, combined with sedentary lifestyles exacerbated by car dependency and North America's highly-processed and high-calorie diets, creates a confluence of risk for obesity and its consequences, including diabetes (see Chapters 1, 4 and 5 of this atlas for more information).

Diabetes in Peel region

Overall, the prevalence of diabetes was higher in Peel region than in the GTA and the rest of the province as a whole, while the prevalence of overweight and obesity in Peel was slightly higher than in the GTA, but similar to Ontario as a whole. Close to half of Peel residents were overweight or obese, and one in 10 had diabetes. The pattern of obesity in Peel did not closely resemble the pattern of diabetes, likely due to the protective effect of high socioeconomic status in some areas and the development of diabetes at lower body weights in some ethnoracial groups. The highest diabetes rates were found in northeast and outlying areas of Brampton, and northeast Mississauga while the lowest rates were found in south and west Mississauga, and in Caledon. Areas with lower diabetes rates also tended to have higher socioeconomic status and lower proportions of visible minorities. The high rates of obesity and diabetes were expected, given the confluence of risks in many areas of Peel region. Modifiable risk factors include inactive living and poor diets. These behavioural issues are complex and may require attention at the level of the individual (e.g., weight loss counselling), the region (e.g., building walkable neighbourhoods) and the public policy arena (e.g., farm and food pricing policies) (see Chapters 2, 4, 5 of this atlas for more information).

Built environment

As already noted, the physical layout of Peel region is dominated by its role as a major transportation hub. Apart from downtown Brampton, central Bolton, and smaller centres in Mississauga and Caledon, much of Peel region was built after 1945 and followed a typical suburban development pattern. This pattern lends itself to car use; not surprisingly, walking/bicycling trips and use of public transit were quite low, while car trips and car ownership were found to be very high. Walking and bicycling trails were often disconnected, a pattern that does not support active transportation for trips to work, school or running errands. Walkable destinations were sparse in outlying areas of Peel, especially in northeast and outlying areas of Brampton, and in some areas in Mississauga. Many of these areas also had the highest rates of diabetes. Due to data and methodological limitations, some built environment characteristics that influence walking and bicycling could not be investigated. These include sidewalks, street lighting, road width, building setbacks, cleanliness and absence of garbage, and perception of safety. While land use and urban design cannot be transformed quickly, high immigration levels in Peel require a rapid pace of housing starts as

well as the retail, commercial and public services needed to support the growing population. This pace of development provides an opportunity to modify planning and urban design standards in a way that would support active transportation and ready access to healthy resources (see Chapter 5 of this atlas for more information).

Ethnicity

Certain ethnic groups have a higher risk of developing diabetes, especially those from South Asia, sub-Saharan Africa and the Caribbean.[1-3] Much recent immigration to Peel region has been from these high-risk areas of the world. Areas with high rates of diabetes in Peel had high concentrations of South Asian and Black visible minorities, as well as higher proportions of recent immigrants and those not speaking English. While ethnicity itself is not modifiable, many immigrant and ethnic groups have specific cultural preferences and practices that may support or hinder healthy living. On average, new immigrants arrive in Canada equally as healthy or healthier than their Canadian-born counterparts, but their health deteriorates over time.[4] These groups may be accustomed to healthier diets in their home countries than those they encounter upon arrival in Canada. Effective strategies that support the continuation of home-country cultural preferences need to be explored. Policies that help immigrants to surmount language and cultural barriers to obtaining health information and health care may also be important (see Chapter 4 of this atlas for more information).

Socioeconomic status

Income and education are consistently related to diabetes in many areas of the developed world, with higher rates among people with lower socioeconomic status (SES). Using area-level characteristics, Peel region appeared to follow this well-established pattern, with higher rates of diabetes generally found in areas with lower SES. Somewhat different patterns for income and education were seen across the three Peel municipalities. In Brampton, many high diabetes areas were in the middle income category and had lower levels of educational attainment. In northeast Mississauga, a cluster of areas surrounded by industrial land was home to residents with high rates of diabetes, lower income and a higher percentage of residents who did not complete high school. Relatively high SES profiles and low diabetes rates were seen across Caledon and in south Mississauga. The many ways in which low SES contributes to obesity and diabetes are complex. Important pathways may include poor quality diets as a result of the high cost and lower availability of healthy foods, lack of opportunities to be physically active, and cost barriers to obtaining some health services and programs, including medications and devices.[5] These can be considered opportunities for intervention (see Chapter 3 of this atlas for more information).

Resources for healthy living

Regular physical activity is a requirement for good health and its absence is strongly related to obesity and type 2 diabetes.[6] Across Canada, only a minority of people achieve the amount of physical activity thought to be necessary to achieve optimal health benefits and this proportion has been declining over time.[7,8] In Peel region, only a third to a half of residents reported achieving at least a moderate activity level equivalent to walking 30 – 60 minutes per day during their leisure time. Areas with lower rates of moderate activity were generally found to have higher rates of diabetes. Opportunities for physical activity can take the form of local parks, school yards and public and private recreational facilities. Most Peel region residents lived close to a park or school yard, but many lived farther from large parks and from both public and private recreational facilities. Northeast and west Brampton, and scattered areas of Mississauga had the lowest concentration of and longest distances to these facilities. There was not a strong concordance between availability of places to be physically active and diabetes, suggesting that other factors were influencing physical activity. The appropriateness and acceptability of the types of recreational facilities and programs available for the many ethnocultural communities of Peel may require attention.

More Canadians are consuming pre-prepared foods for their meals.[11] The high availability and low cost of energy-dense, highly-processed foods served in large portions is thought to be contributing to the epidemic of obesity and diabetes in the developed world.[9,10] These foods are often less expensive than healthy foods such as fresh fruits and vegetables, whole grains, and lean meats and fish, and they are more readily available in easily accessible convenience stores and fast-food outlets. Existing survey data suggest that fruit and vegetable intake is low among both Canadians and Peel residents.[11] However, while the measure used is considered to be a reasonable proxy for overall diet quality, it may not fully capture adherence to fruit and vegetable intake recommendations from Canada's Food Guide.[12] The availability of less healthy food was found to be at least five times greater than the availability of healthy food in Peel and both food sources were often found clustered in the same areas.

Economically disadvantaged areas in Peel had good access to healthy and less healthy foods, suggesting the absence of food deserts in lower income areas of Peel. Areas with lower rates of diabetes generally had low food availability of any type. These findings suggest major room for improvement in diets, increased availability of more healthy foods and fewer less healthy foods in Peel. Long commuting times and excess exposure to fast food retailers may further impede the ability of Peel residents to maintain a healthy lifestyle.

Health services play a major role in the prevention, detection and treatment of diabetes. This atlas was able to investigate geographic aspects of access to health services, but not their actual availability (i.e., if doctors' offices were accepting new patients), acceptability or appropriateness. Family physicians/general practitioners were well distributed across Peel region, as were optometrists. Specialized health providers and services, including endocrinologists, ophthalmologists and diabetes programs, were clustered in a few areas of Peel region (often near hospitals) that did not always correspond with high-diabetes areas. For example, northeast Brampton had high rates of diabetes, but relatively low access to specialized health services. Availability and use of appropriate, community-based, culturally-specific health services are key factors to reducing the burden of diabetes in Peel (see Chapters 6, 7 and 8 of this atlas for additional information).

OPPORTUNITIES

Overview

Peel region has seen a tremendous rise in the rate of diabetes over the past decade. Peel now has one of the highest rates of diabetes in the province and these levels will likely continue to rise, fuelled by the growing rates of obesity. Fortunately, there is strong evidence that type 2 diabetes itself can be prevented or delayed in high-risk groups (individuals who have pre-diabetes) by achieving a modest degree of weight loss through dietary changes and increased physical activity.[13,14] Moreover, there is mounting evidence that healthier communities – ones that better support physical activity and healthy eating – have lower rates of diabetes.[15,16]

The high rates of diabetes in Peel require enhancing opportunities for diabetes prevention and building on existing programs undertaken by the Region of Peel to understand barriers and facilitators to improving healthy behaviours. Furthermore, findings from this atlas allow the identification of diabetes "hot spots" – communities that have increased rates of diabetes or a high concentration of risk factors for diabetes (e.g., a greater percentage of the population belonging to ethnic groups carrying a high genetic predisposition for developing diabetes) that can be targeted for more directed interventions. This research demonstrates large gaps between optimal and existing levels of physical activity and healthy eating which provides plenty of opportunities to promote healthier lifestyles. The Region of Peel has already done extensive data gathering to gain knowledge about causes of low activity and poor eating behaviours, and has had some success in developing interventions to promote healthier lifestyles in high-risk communities.

Diabetes prevention strategies can be categorized based on their scope, such as global (e.g., whole populations) versus targeted (e.g., high-risk communities or individuals). These include:

a) Population-level strategies – those targeting an entire municipality or region

b) Community-level strategies – those targeting high-risk areas or populations

c) Individual strategies – those targeting high-risk individuals

Given the diverse cultural makeup of the population in Peel, interventions that are undertaken need to be culturally-specific and, ideally, delivered in various languages. A summary of the types of initiatives that could lead to healthier lifestyles and therefore reduced rates of obesity and type 2 diabetes is outlined below.

A. POPULATION-BASED STRATEGIES

Increasing activity by reducing dependence on cars for travel

There is a growing literature on the role of the built environment in promoting or impeding the adoption of a healthy lifestyle.[17-21] Trends in urban development since the 1960s and 1970s have led to residential neighbourhoods with limited opportunities for residents to walk or bicycle as a means of transportation. The following design features have been shown to promote physical activity and may be associated with lower rates of obesity: higher levels of residential dwelling density and intersection density (a measure of street connectivity), greater availability of and access to walkable destinations, and a higher mix of land use (i.e., the mixing of various land uses, including residential, retail, workplace and institutional, in relatively close proximity to each other within the same area or neighbourhood).[22-24]

Given the high rate of growth in Peel, there is a critical need to develop new communities that promote daily active living. The Region has undertaken a substantial initiative towards creating new standards and guidelines for urban development in Peel that would require development submissions to consider the impact of community design on health. Existing communities can also be modified over time. Many cities are now setting limits on further suburban sprawl, instead favouring medium- and high-density development in major employment and retail areas, and along major transportation corridors. Targeting lower-income, higher-immigration areas for greater residential densities, better public transportation and mixed land use may yield important health benefits for vulnerable populations living in these areas.

Improving residential street lighting and aesthetics, ensuring the presence of sidewalks, addressing safety issues and reducing the impact of physical barriers such as highway overpasses and on-ramps by building bridges or tunnels to connect adjacent communities are all potential solutions for improving active transport in Peel. Bicycle and walking trails also provide opportunities for local residents to be physically active. Opportunities include making the existing trails and foot or bicycle paths more connected by linking them together and facilitating their use as a transportation modality or for leisure. Peel could put an emphasis on safe bicycle infrastructure such as increasing connections between existing bicycle routes, creating dedicated pathways and lanes on roadways, and adding more facilities for bicycle storage and lock-up. Ensuring that bicycle infrastructure is safe from vehicle traffic, well lit and attractive should be an important focus to encourage more Peel residents to bicycle on a regular basis. Consideration could be given to linking walking paths within neighbourhoods to allow safe transportation of children to schools and parks, and evaluating whether programs like walking school buses could be safely implemented in some areas. However, promoting active transportation will be optimally effective only if other aspects of the built environment are improved as well.

Enhancing access to recreational spaces

There is some evidence to suggest that children living in areas that have better access to play spaces are more physically active.[25-26] Proximity to schools and smaller parks is generally good in much of Peel. However, there may be an opportunity to enhance the use of existing parks in Peel by improving safety in areas where such concerns exist (e.g., by installing fencing around parks to ensure children's safety from surrounding traffic). School yards may provide an alternative space for recreational activities in communities that have less parkland nearby. In Peel, some school yards may be underused because of a lack of lighting in the evening time or closing of the property after school hours. There may be an opportunity for local governments to partner with school boards or individual schools in order to identify and resolve barriers to opening school yards to the community after hours, or, if necessary, to develop agreements that may share the costs and responsibilities of extending school yard access to the public.

In contrast to parks and schools, public recreational facilities were less evenly distributed, clustering in certain locations. There may be some capacity to augment existing outdoor and indoor play spaces where limited access exists. Furthermore, consideration could be given to providing subsidies to make private indoor play spaces more accessible in lower income areas or supporting not-for-profit organizations to develop and maintain safe and accessible play spaces in high-need areas.

Promoting healthier eating habits

Healthy eating is essential for good health and a critical component of diabetes prevention and management strategies.[27-29] Similar to other Ontarians and Canadians overall, the rates of fruit and vegetable intake among Peel's residents leave a lot of room for improvement, as does the overall food retail landscape which is dominated by retailers serving less healthy foods. Since there are no food deserts in lower income areas in Peel, it is unclear whether incentives for bringing in more healthy retailers into less advantaged communities would help improve residents' eating habits. Overall, it may be more fruitful to focus on global strategies to promote healthier options and smaller portion sizes within existing food stores and eating places.

Given the very high proportion of less healthy food retailers dominating the current food landscape in Peel, there is also a need to consider strategies aimed at reducing the overwhelming exposure to less healthy food. This will be a challenging avenue to pursue because the location of food retail stores and eating places – as well as the food choices offered within these venues – is driven largely by market forces and, thus, commonly seen to be outside the reach of city or regional planning. An example of an initial intervention in this direction could involve amending zoning regulations to limit the number of less healthy retailers (e.g., fast-food outlets) near vulnerable population groups, such as near schools. Furthermore, using incentives to attract healthy and culturally-appropriate grocery stores and supermarkets to rapidly developing areas of Peel (some of which have high rates of diabetes among its residents) may be worthwhile since the food landscape within such areas is not yet established.

Community-level interventions to promote healthier eating patterns could also occur within local workplaces and food businesses by promoting more vegetables, fruit and other healthier options on menus, encouraging options for smaller portion sizes and promoting strategic placement of healthier options within stores. For example, encouraging convenience stores (including those in gas stations) to stock fresh fruits and vegetables may be a way to make healthy choices more available and accessible as residents run their multiple daily errands. Adapting public spaces to create community gardens may be another initiative that could promote healthier eating habits while establishing stronger community ties.[30] Finally, supporting healthier, culturally-specific eating habits among the many

diverse ethnocultural groups in Peel through strategies such as encouraging food retailers to offer healthy culturally-specific foods will continue to be of great importance.

School-based programs

Schools are important settings where children and youth spend a large portion of their day and gain exposure to social norms relating to healthy eating and physical activity. Thus, schools are key venues for promoting and supporting healthy behaviours. The Region of Peel has been and continues to be very proactive in supporting province-wide policies to promote healthy eating and physical activity, as well as undertaking its own local initiatives. A number of recent school-based initiatives, such as the Ministry of Education's School Food and Beverage Policy (2010), that required all schools to offer healthy food and beverage choices, have been fully implemented in Peel. The Region of Peel worked to support these initiatives by providing training and workshops to school board staff on understanding and applying the policy, piloting the policy at 12 schools prior to mandatory implementation and introducing a social marketing campaign related to the policy for both students and the broader community. In the future, it will be important for Peel to monitor the successes and challenges of this policy.

With respect to physical activity among school-age children, Peel Public Health supports the Ministry of Education's Daily Physical Activity (DPA) policy which strives to improve or maintain elementary school children's physical fitness by providing a minimum of 20 minutes of sustained moderate-to-vigorous activity during each school day. Peel Public Health also recently undertook an assessment of levels of physical activity through the Student Health Survey 2012. Continuing and building on such initiatives to shift norms around healthy eating within schools and increase daily levels of physical activity among all school-age children (e.g., by enhancing physical activity both during school hours and in after-school programs) should continue to be a priority in the coming years. Further policy changes may be needed to ensure that children undertake the daily one hour of physical activity recommended by Health Canada, including consideration of expanding physical activity programs within school curricula and after-school programs.[31,32]

B. COMMUNITY-LEVEL STRATEGIES

Information on facilitators and barriers to physical activity and healthy eating gathered by the Region of Peel will be instrumental in designing targeted interventions at the community level. Focusing on areas that have higher rates of diabetes or high-risk populations (e.g., the South Asian community, etc.) could be most fruitful in reducing the illness. Examples of interventions that promote healthy lifestyle changes in target populations implemented by Peel Public Health are the Diabetes Prevention Pilot Project and the Diabetes Prevention Social Marketing Campaign, both geared to Peel's South Asian population. Expanding this type of intervention on a broader scale could have a meaningful impact on lowering the risk of diabetes within high-risk communities. Culturally-sensitive programs promoting physical activity, including community walking programs in residential areas and malls, as well as other recreational programs, could be developed in high-risk communities. Public recreational facilities could be encouraged to offer supportive culturally-appropriate physical activity programs, cooking classes, food shopping classes and other interventions as deemed appropriate. Raising awareness through effective social marketing and advertising about the programs offered, as well as providing transportation support to non-local residents for whom travel distance to recreation venues may be a barrier, could be important strategies to ensure that such interventions serve the widest possible segment of Peel residents. Local municipalities could also consider locating new recreational centres in poorly-served areas, particularly in the new and rapidly developing areas of the region, or seeking alternative venues to offer community programs.

C. INDIVIDUAL STRATEGIES

Although it is widely documented that physical activity and weight loss can delay or prevent type 2 diabetes, interventions targeted at the individual level require intensive resources and their reach to the entire population is limited.[13,14] There is a growing movement within primary care settings to develop structured programs to support dietary changes and exercise programs for individuals with pre-diabetes. Similar programs could be offered in community settings for patients deemed to be at high risk for developing diabetes using a screening tool such as the CANRISK questionnaire (which is currently being implemented and validated by the Public Health Agency of Canada).[33] Additional interventions to be considered include various web-based tools that can support lifestyle changes as these have the potential to reach a broad audience and thus have greater impact.

Access to and regular use of health services is essential for prevention, early diagnosis and the optimal management of diabetes and the prevention of diabetes-related conditions.[32] There was a fairly even distribution of family physicians/general practitioners (FPs/GPs) across Peel region, but diabetes education programs were offered at relatively few locations. Consideration should be given to establishing satellite diabetes education programs within high-need areas, including the rapidly developing, higher immigration and high-diabetes areas of north, northeast and east Brampton. Because there may be a high proportion of residents who may not speak English in areas with high rates of diabetes, there is also a clear need to provide language- and culturally-specific health services in these areas. The Ontario Diabetes Strategy established by Ontario's Ministry of Health and Long-Term Care has led to increased access to diabetes teams (including nurses and dietitians), as well as the development of Diabetes Regional Coordination Centres (DRCC) in each region to promote enhanced access to care for people with diabetes and more effective diabetes care delivery.[34] Developing an alliance with the Central West DRCC to coordinate and build on existing public education strategies, diabetes prevention and management programs may be beneficial. Other priorities include establishing or enhancing existing programs to link new immigrants to health services.

SUMMARY

Stemming the tide of overweight and obesity is critical to addressing the current diabetes epidemic. However, halting the obesity epidemic will require a multifaceted approach that focuses both on individuals at risk and the population as a whole. Lessons can be learned from the successful anti-smoking campaigns from the past two decades which led to a 43% drop in tobacco use among Canadians. Implementing different but complementary approaches simultaneously, including clinical interventions, public education campaigns, and policy changes such as increased taxing, smoking bans and limits to tobacco advertising, resulted in a shift in the public's perception of smoking and tobacco consumption rates fell considerably. The battle against obesity will likely be more challenging given the overall nature and complexity of this condition.

While successful policies and actions to affect broad societal changes in health behaviours must undoubtedly involve multi-pronged approaches at all levels of government (i.e., national, provincial, municipal), it is also the case that a great number of highly successful programs can, and have been built "bottom-up" in towns and cities. Local policy makers have the advantage of being more sensitive to local conditions – that is, the health issues and beliefs of local residents, as well as the opportunities and barriers within the physical and social environments that individuals experience daily, such as neighbourhoods, schools, stores, restaurants and recreational spaces. Because of this sensitivity to local conditions and a greater capacity for creativity and innovation, local policy makers, including public health authorities, are in a prime position to reshape the physical and social environments to make healthy choices the easiest or default options for all residents.

REFERENCES

1. Creatore MI, Moineddin R, Booth G, Manuel DH, Desmeules M, McDermott S, et al. Age- and sex-related prevalence of diabetes mellitus among immigrants to Ontario, Canada. CMAJ. 2010;182(8):781-789.
2. Harris MI, Flegal KM, Cowie CC, Eberhardt MS, Goldstein DE, Little RR, et al. Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in U.S. adults. The Third National Health and Nutrition Examination Survey, 1988–1994. Diabetes Care. 1998;21:518-24.
3. Zaninotto P, Mindell J, Hirani, V. Prevalence of cardiovascular risk factors among ethnic groups: results from the Health Surveys for England. Atherosclerosis. 2007;195:e48-e57.
4. McDonald JT, Kennedy S. Insights into the 'healthy immigrant effect': health status and health service use of immigrants to Canada. Soc Sci Med 2004; 59(8): 1613–27.
5. Creatore MI, Gozdyra P, Booth GL, Ross K, Glazier RH. Socioeconomic status and diabetes. In: Glazier RH, Booth GL, Gozdyra P, Creatore MI, Tynan A-M, editors. Neighbourhood Environments and Resources for Healthy Living - A Focus on Diabetes in Toronto. Institute for Clinical Evaluative Sciences. Toronto; 2007.
6. Katzmarzyk PT, Janssen I. The economic costs associated with physical inactivity and obesity in Canada: an update. Can J Appl Physiol. 2004;29(1):90-115.
7. Colley RC, Garriguet D, Janssen I, Craig CL, Clarke J, Tremblay MS. Physical activity of Canadian adults: accelerometer results from the 2007 to 2009 Canadian Health Measures Survey. Health Rep. 2011;22(1).
8. Shields M, Tremblay M, Laviolette M, Craig CL, Janssen I, Connor Gorber S. Fitness of Canadian adults: results from the 2007-2009 Canadian Health Measures Survey. Health Rep. 2010;21(1):1-15.
9. World Health Organization. Diet, Nutrition, and the Prevention of Chronic Diseases: Report of a Joint WHO/FAO Expert Consultation. Geneva, Switzerland; 2003.
10. Story M, Kaphingst KM, Robinson-O'Brien R, Glanz K. Creating healthy food and eating environments: policy and environmental approaches. Annu Rev Public Health. 2008;29:253-272.
11. Garriguet D. Canadians' eating habits. Health Rep. 2007;18(2):17-32.
12. Garriguet D. Diet quality in Canada. Health Rep. 2009;20(3):1-12.
13. Knowler WC, Barrett-Connor E, Fowler SE, et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. N Engl J Med. 2002;346:393-403.
14. Tuomilehto J, Lindstrom J, Eriksson JG, et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. N Engl J Med. 2001;344:1343-50.
15. Auchincloss AH, Diez Roux AV, Brown DG, Erdmann CA, Bertoni AG. Neighborhood resources for physical activity and healthy foods and their association with insulin resistance. Epidemiology. 2008;19(1):146-157.
16. Auchincloss AH, Diez Roux AV, Mujahid MS, Shen M, Bertoni AG, Carnethon MR. Neighborhood resources for physical activity and healthy foods and incidence of type 2 diabetes mellitus: the Multi-Ethnic Study of Atherosclerosis. Arch Intern Med. 2009;169(18):1698-1704.
17. Heart and Stroke Foundation of Canada. Heart and Stroke Foundation 2005 Report Card on Canadians' Health - Has the Suburban Dream Gone Sour? (2005) [Internet]; cited December 15, 2011. Available from: www.heartandstroke.on.ca/site/c.pvI3IeNWJwE/b.3582057/k.8602/2005_Report_Card__Has_the_subarban_dream_gone_sour.htm.

18. Saelens BE, Handy SL. Built environment correlates of walking: a review. Med Sci Sports Exerc. 2008;40(7 Suppl):S550-66.

19. Davison KK, CTL. Do attributes in the physical environment influence children's physical activity? A review of the literature. Int J Behav Nutr Phys Act. 2006;3(1):19.

20. Adams MA, Sallis JF, Kerr J, et al. Neighborhood environment profiles related to physical activity and weight status: a latent profile analysis. Prev Med. 2011.

21. Saelens BE, Sallis JF, Frank LD. Environmental correlates of walking and cycling: findings from the transportation, urban design, and planning literatures. Ann Behav Med. 2003;25(2):80-91.

22. Berrigan D, Troiano RP. The association between urban form and physical activity in U.S.adults. Am J Prev Med. 2002;23(2 Suppl):74-79.

23. Booth GL, Creatore MI, Gozdyra P, et al. Neighbourhood Infrastructure and Health. In: Glazier RH, Booth GL, Gozdyra P, Creatore MI, Tynan A-M, editors. Neighbourhood Environments and Resources for Healthy Living — A Focus on Diabetes in Toronto. Institute for Clinical Evaluative Sciences. Toronto; 2007.

24. Townshend T, Lake A. Obesogenic urban form: Theory, policy and practice. Health Place. 2008.

25. Veugelers P, Sithole F, Zhang S, Muhajarine N. Neighborhood characteristics in relation to diet, physical activity and overweight of Canadian children. Int J Pediatr Obes. 2008;3(3):152-159.

26. Tucker P, Irwin JD, Gilliland J, He M, Larsen K, Hess P. Environmental influences on physical activity levels in youth. Health Place. 2009;15(1):357-363.

27. Wilson C, Brown T, Acton K, et al. Effects of clinical nutrition education and educator discipline on glycemic control outcomes in the Indian health service. Diabetes Care. 2003;26:2500-2504.

28. Brekke HK, Jansson PA, Lenner RA. Long-term (1- and 2-year) effects of lifestyle intervention in type 2 diabetes relatives. Diabetes Res Clin Pract. 2005;70:225-234.

29. Lemon CC, Lacey K, Lohse B, et al. Outcomes monitoring of health, behavior, and quality of life after nutrition intervention in adults with type 2 diabetes. J Am Diet Assoc. 2004;104:1805-1815.

30. Armstrong, D. A survey of community gardens in upstate New York: Implications for health promotion and community development. Health Place. 2000;6(4):319-327.

31. ParticipACTION. (2011)[Internet]; cited December 19, 2011. Available from: www.participaction.com/en-us/Home.aspx.

32. Canadian Physical Activity Guidelines. (2011)[Internet]; cited December 19, 2011. Available from: www.csep.ca/english/view.asp?x=804.

33. Public Health Agency of Canada. The Canadian Diabetes Risk Questionnaire CAN RISK. (2011)[Internet]; cited December 15, 2011. Available from: www.phac-aspc.gc.ca/cd-mc/diabetes-diabete/canrisk/index-eng.php.

35. Ontario Ministry of Health and Long Term-Care. About the Ontario Diabetes Strategy. (2009)[Internet]; cited December 3, 2011. Available from: www.news.ontario.ca/mohltc/en/2009/11/ontario-diabetes-strategy.html.