TYPE 2 DIABETES AMONG SOUTH ASIANS: THE UNSWEETENED ACCOUNT

by

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Abstract

In 2005-2006, 5.9% of Canadians suffered from diabetes up by 22% since 2001-2002. Diabetes is a tremendous strain on the Canadian health system, costing $17.4 billion in 2007 alone. Type 2 diabetes makes up 90% of all diabetes cases, in Canada. People of South Asian descent are among the most vulnerable populations to Type 2 diabetes. I find that not enough is being done to prevent and manage Type 2 diabetes among South Asians in Metro Vancouver.

Using the 2005-2006 Canadian Community Health Survey, I find that Type 2 diabetes prevalence among South Asians in Metro Vancouver is 8.4% - much higher than in the general population. I recommend that BC health agencies increase their information dissemination efforts among patients of South Asian descent. The existing Punjabi diabetes information sessions should be expanded throughout Metro Vancouver and patient travel to sessions should be subsidized by the BC Ministry of Health.

Keywords: South Asians, Metro Vancouver, Type 2 diabetes, Prevention, Policy, Lifestyle choices,

Executive Summary

This capstone focuses on the policy problem that not enough is being done to prevent and manage Type 2 diabetes among South Asians in Metro Vancouver. At the heart of the capstone, my policy question is how prevention and management efforts can reduce prevalence of Type 2 diabetes among South Asians residing in Metro Vancouver.

To study the policy problem, I utilize the Canadian Community Health Survey Cycle 3.1 and informational interviews with Metro Vancouver South Asians who have Type 2 diabetes. I find that the prevalence of Type 2 diabetes among South Asians in Metro Vancouver is 8.4%, which is much higher than the Canadian average of 5.9%. The informational interviews show that people are more likely to adhere to dietary and physical activity recommendations if they understand them and are able to adapt them into their cultural context.

Using the survey and interview data I formulate three policy alternatives to address Type 2 diabetes: Patient Focus, Physician Focus and Population Focus. I use four criteria- cost, administrative feasibility, effectiveness, community acceptability to evaluate the alternatives. Based on the evaluation I recommend that the Patient Focus alternative be implemented. As part of this recommendation, Punjabi information sessions would be offered at Diabetes Education Centres across Metro Vancouver and the BC Ministry of Health would collaborate with the Canadian Diabetes Association to hold diabetes awareness expositions in the community at large. As part of the policy, the Ministry would subsidize transportation costs for patients attending information sessions.

Dedication

I would like to dedicate this capstone to Ankit, Pinky, Mama, Papa and Anupam.

Ankit and Pinky your encouragement has driven me to keep following my dreams.

Mama and Papa, your love, knowledge and support have always been the backbone of my accomplishments. You ensured that when it came to opportunities, the sky would be the limit for me. Thank you for recognizing the ambitions that I stated when I sang the following lines:

दिल है छोटा सा

छोटी सी आशा

मस्ती भरे मन कि भोली सी आशा

चाँद तारों को छूने कि आशा

आसमानों में उड़ने कि आशा

दिल है छोटा सा

छोटी सी आशा

To Anupam,

انوپم آپ ہمیں اونچھیوں کو چھونے کی پریرنا دیتے ہیں
ہمارے اس مکام تک پہونچنے میں آپکے پیار اور امان کا بہت بڑا ہاتہ
ہے
آپکی چاہت کے اعزاز میں ہم جو بھی کہیں وہ کم ہے
۔ اسلئے بس یہ شیر فرماتے ہیں

وہ تو پانی کی بوند ہے جو آنکھوں سے بہ جائے
آنسو تو وہ ہے جو تڑپ کر آنکھوں میں ہی رہ جائے
وہ پیار کیا جو لفظوں میں بیان ہو جائے
پیار تو وہ ہے جو آنکھوں میں نذر آ جائے

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I would also like to thank the individuals who graciously agreed to provide me with valuable information during the interviews. Your input helped me strengthen my understanding of the South Asian community.

I would like to acknowledge the support of my MPP cohort. I would not have made it through without you. In particular, I would like to thank Barbara Powidel and Agnes Rosicki for lend me a listening ear when I needed it most. I wish you both every success in life. Finally, I would like to thank Lisa Frey for being an exceptionally understanding and supportive roommate.

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1: Introduction

Type 2 diabetes is a growing epidemic around the world. It is taking a heavy toll on the healthcare systems of developed as well as developing countries. South Asians are among the most vulnerable populations to Type 2 diabetes. In this study, I investigate how prevention and management techniques can help reduce Type 2 diabetes prevalence and related complications among South Asians living in Metro Vancouver. Sedentary lifestyles and unhealthy diet practices such as excessive fat content in food are driving up the Type 2 diabetes prevalence rate among South Asians. A suitable example of the unhealthy dietary practices is the consumption of the popular food item butter chicken. One serving of butter chicken has twice the daily fat requirements of an average adult.

Although the literature points to varying diabetes prevalence among different ethnicities, prevention and management strategies are not taking a nuanced approach. Metro Vancouver, British Columbia (BC) is among the top choices of residence for South Asians in Canada. However, the British Columbia healthcare system has not kept pace with their specific healthcare needs.

In this capstone, my research data are drawn from the Canadian Community Health Survey Cycle 3.1 and information interviews with Type 2 diabetics of South Asian descent as well as healthcare professionals who treat diabetic patients. First, I examine the diabetes related data in the Canadian Community Health Survey Cycle 3.1. Then, to enhance the findings of the survey analysis I conduct the informational interviews. These interviews help validate the survey results and provide information about cultural barriers that impede diabetes prevention and management efforts.

In section 2, I describe the classifications of diabetes and its costs. In section 3 of this study, I provide statistics about prevalence of Type 2 diabetes and its associated costs in Canada and BC. Section 4 describes the various causes of diabetes and interventions that help prevent and manage it. In Section 5, I describe my target demographic- South Asians in Metro Vancouver. Section 6

describes existing interventions for diabetes in BC. In section 7, I provide details about my policy problem and stakeholders. In section 8, I describe the survey and interview techniques followed by discussion of the survey and interview analysis in section 9. Section 10 details my policy goals and criteria measures. In section 10, I describe my policy options and evaluate them. I present the conclusion for this study in section 11.

2: Diabetes and its related costs

In this section, I provide details about the various classifications of *diabetes mellitus* or diabetes, and its related costs.

2.1   Classification of Diabetes

Diabetes is a condition in which a person's pancreas does not produce or stops producing insulin, a hormone required to produce energy from glucose in our bodies.[1] For diagnosing diabetes, medical practitioners use the unit of millimoles of glucose per litre or mmol/L of blood. Individuals whose blood glucose level measures between 6.1mmol/L and6.9mmol/L after fasting for 8 hours are considered pre-diabetic and individuals whose blood glucose level exceeds 7mmol is classified as diabetic (CDA, 2008).

Furthermore, the medical establishment classifies diabetes into three categories: Gestational, Type 1, and Type 2. Gestational diabetes occurs in pregnant women only for the duration of their pregnancy. Factors such as pre-pregnancy weight, pregnancy late in life, and family history of diabetes increase the risk of gestational diabetes (Berkowitz, Lapinski, Wein, & Lee, 1992). Prevalence of gestational diabetes can increase the chances of both the mother and child developing Type 2 or Type 1 diabetes. Type 1 diabetes, unlike Gestational diabetes is chronic. Type 1 diabetes patients are unable to produce insulin. The medical community has not yet established the cause of this inability. Type 1 diabetes is generally diagnosed during childhood or early teenage years. Its patients are dependent on lifelong insulin medication in order to convert the glucose in their bodies into energy for sustenance.

Type 2 diabetes patients stop producing or effectively using the insulin their bodies produce. Until recently, Type 2 diabetes afflicted people in later stages of their life, but recently, children are

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[1] The information in this subsection, unless otherwise indicated, is from the CDA (2009a).

also being diagnosed with the disease. Various risk factors such as a family history of diabetes, obesity, unhealthy eating and an inactive lifestyle are associated with an increased risk of Type 2 diabetes. As the disease progresses in severity, some Type 2 diabetes patients also require insulin medication (CDA, 2010).

2.2   Costs of diabetes

When calculating the cost of diabetes to society, one has to consider costs not just of treating and managing diabetes alone but also the related diseases and complications that arise from advanced stages of diabetes. As diabetes progresses, the high level of glucose accumulating in the body causes complications such as blindness, kidney or renal diseases, heart attacks, nerve damage, lower extremity amputations and erectile dysfunction (O'Brien et al., 2003). Therefore, when calculating the cost of diabetes, the cost of the above related complications or *comorbidities* must also be considered.

Diabetes and its comorbidities create two types of costs for the healthcare system: direct and indirect. Direct costs are expenses for medical services and products paid directly via the health system (for example, costs of hospitalization, physician's services, laboratory tests and medications) (Hernan et al., 2003). The main contributor to direct costs of diabetes in Canada is cardiovascular disease followed by neurological complications and renal diseases (Dawson et al., 2002). In Canada, direct costs are paid by health insurance agencies responsible for the provinces and territories. Indirect costs of diabetes are present or future productivity lost by the patient or society (for example costs due to time lost at school, earnings lost at work, and death) (Dawson et al., 2002). The full cost of diabetes is much higher than lost future productivity since a healthy person would be more able to contribute to his/her community and build social capital. Lost productivity is an imperfect proxy for indirect costs.

In summary, unhealthy eating and an inactive lifestyle can increase people's chances of becoming Type 2 diabetic. A high rate of diabetes in Canada will inflict large direct and indirect costs on the Canadian healthcare system. In the next section, I describe the prevalence and costs of diabetes in Canada and BC.

3: Diabetes in Canada and BC and its related costs

In this section, I present the prevalence of diabetes in Canada and BC. I also give details about the cost of diabetes to the Canadian healthcare system.

3.1   Diabetes in Canada

Of the three kinds of diabetes detailed in the previous section, Type 2 diabetes is the most prevalent in Canada. It accounts for 90 percent of all diabetes patients in Canada while only 10 percent of patients have Type 1 diabetes followed by Gestational diabetes, which afflicts approximately 3.7 percent of all pregnant women (CDA, 2009a). As part of its Canadian Diabetes Strategy, the Centre for Chronic Disease Prevention and Control (CCDPC) set up the National Diabetes Surveillance System (NDSS) to gather information about the status of diabetes in Canada. In 2005-2006, 1,939,247 million Canadians, roughly 5.9 percent of the population, were suffering from diabetes; a 22 percent increase from a 4.8 percent prevalence rate in 2001-2002.[2] Adding to the existing burden, in Canada, approximately 60,000 new diabetes cases emerge each year (Watson et al., 2007). The NDSS estimates that the total number of people with diabetes will hit 2.6 million by 2011, an average increase of 7 percent per year.

The prevalence varies by gender and age. Diabetes prevalence is lower among girls and women (5.5 percent) than among boys and men (6.2 percent). More people over the age of 40 are diabetic than those who are younger indicating that as people get older their chances of developing diabetes increase, possibly contributed to by lifelong health behaviours such as lack of exercise and unhealthy eating. Since Canada's obesity rate is increasing and its population is aging, there will be more Canadians over 40 with higher risk of developing diabetes in the future. Overall, the NDSS finds that diabetics experience a 9-year reduction in life expectancy when compared to non-diabetics.

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[2] The information in this subsection, unless otherwise indicated, is from the CCDPC (2009b).

3.2   Prevalence of diabetes in BC

Diabetes prevalence varies across Canada's provinces. As Table 1 indicates, prevalence is highest in New Brunswick and Nova Scotia and, lowest in Alberta and Quebec.

Table 1 Age Standardized prevalence of diabetes in provinces in 2005-2006.

Province	*Prevalence*
New Brunswick	5.7
Nova Scotia	5.7
Newfoundland and Labrador	5.5
Manitoba	5.4
Ontario	5.3
Prince Edward Island	5.1
Saskatchewan	4.8
British Columbia	4.6
Alberta	4.5
Quebec	4.5

Source: CCDPC (2009b)

BC is among the provinces with the lowest prevalence of diabetes in Canada. However, BC is experiencing a decline in its standing due to its higher growth rate of diabetes. The NDSS data in Figure 1 show the percentage point increase in prevalence of diabetes, in BC, between 1998 and 2005.[3]

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[3] I use the year 1998 as the starting point of the figures because that is the first year the NDSS statistics became available. Prior to the formation of NDSS other Statistics Canada surveys and U.S diabetes rates were used to estimate the diabetes prevalence in Canada. The definition of diagnosed diabetes, of these other surveys, is not consistent with that used by the NDSS; therefore, I have not used the figures of previous surveys to stretch the analysis back to previous years.

Figure 1 Age standardized increases in prevalence of diabetes within provinces between 1998 and 2005.
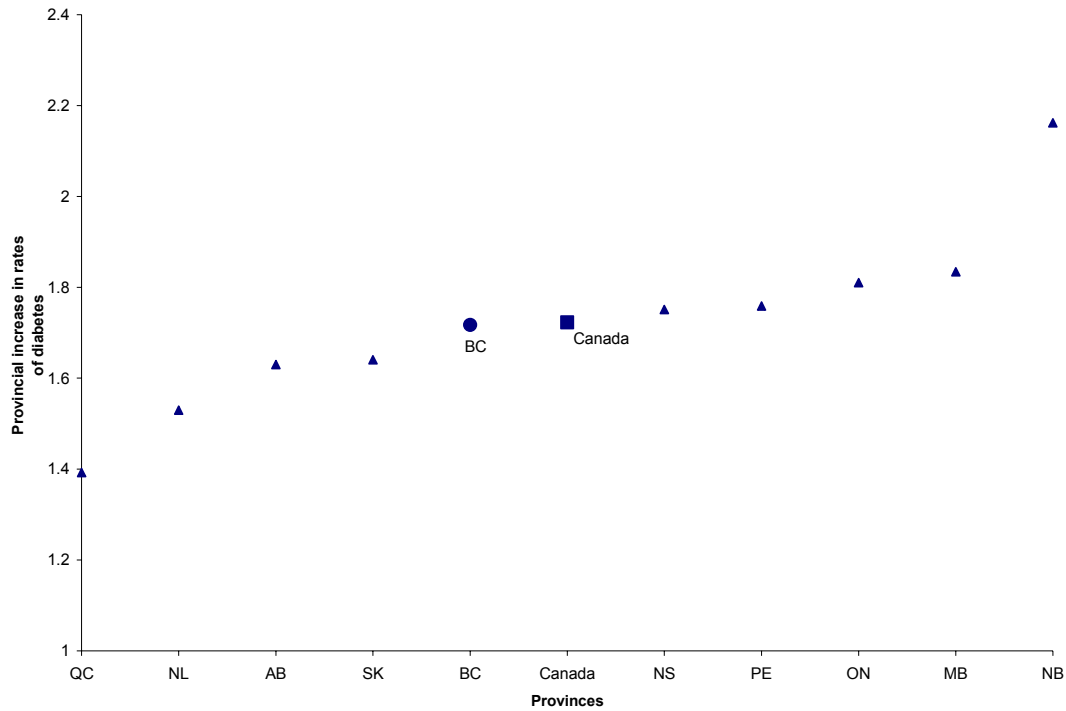
Source: (CCDPC, 2009a)

BC has the sixth highest growth of diabetes in Canada between 1998 and 2005. At a growth of 1.71 percentage points, although BC is below the rates in eastern Canada, it surpasses all the other western provinces, Quebec and Newfoundland and Labrador. BC's growth is almost as high as the Canadian average of 1.72 percentage points.

Within BC, the prevalence of diabetes is growing at an alarming rate. As Figure 2 highlights, the prevalence of diabetes in BC has grown in a linear fashion between 1998 and 2005.

Figure 2 Growth of prevalence of diabetes in BC between 1998 and 2005.
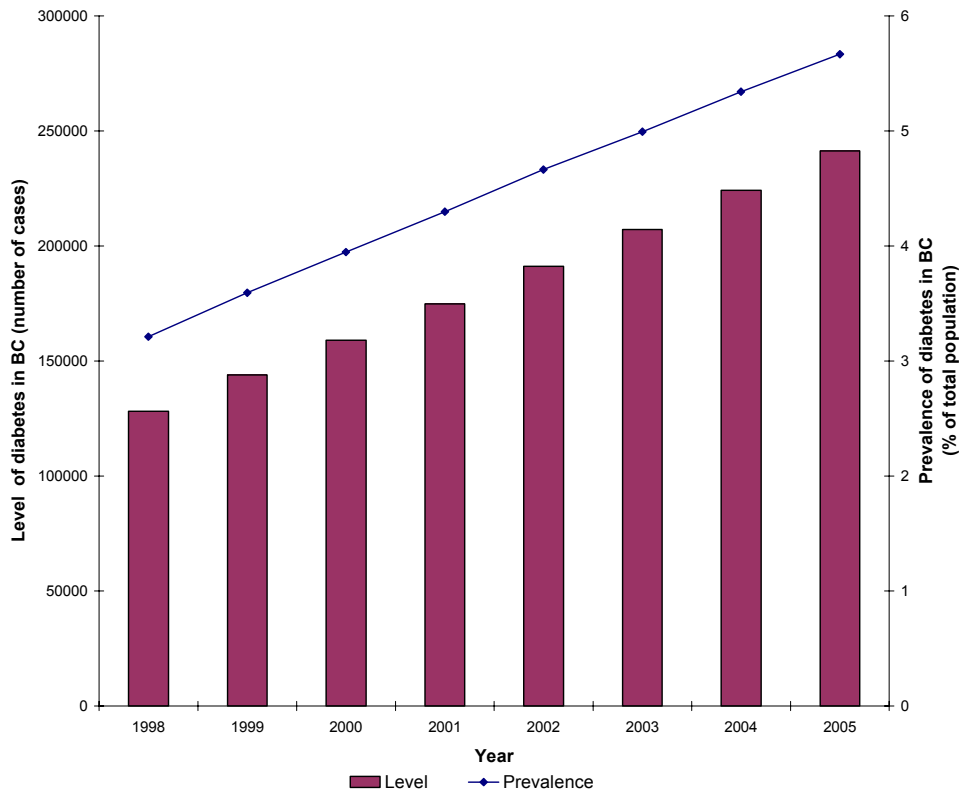
Source: CCDPC (2009a)

The level has nearly doubled from 128,151 cases to 241,357 cases. The prevalence of diabetes in BC has increased from 3.2 percent to 5.7 percent. Similar to the national distribution, BC men have higher diabetes prevalence than women. While the prevalence of diabetes among women grew from 2.9 percent to 5.2 percent among men, it grew from 3.5 percent to 6.1 percent (CCDPC, 2009a).

To summarize, the prevalence of diabetes is growing at a very fast pace within Canada and BC. This fast growth means that the cost of diabetes, to the Canadian healthcare system, will also rise rapidly.

3.3   Cost of Diabetes in Canada

Since the development of diabetes leads to further complications such as heart failure, nerve damage, and kidney failure among others, diabetic patients require more medical attention than non-

diabetics. In 2005-2006, patients with diabetes were hospitalized 23 times more often for lower leg amputations than people without diabetes. For chronic kidney disease, they visited hospitals 7 times more often than people without diabetes. Diabetic patient visits to hospitals, for heart related problems, were 3 times higher than of non-diabetic adults. Finally, people suffering from diabetes visited physicians and specialists 2 to 3 times more often than healthy adults. CCDPC (2009b)

The increased medical attention required by diabetes patients increases the financial burden on the healthcare system. In 1994-95 alone, obesity related Type 2 diabetes led to $423.2 million in direct healthcare expenditure in Canada (Birmingham et al., 1999). In BC, diabetes costs alone constituted 10.2 percent of BC's total healthcare budget in 2003-04 (Finance BC, 2004). The Auditor General of BC estimated that in 2003-04, BC's direct spending on diabetes amounted to $1.04 billion and could rise to $1.2 billion by 2015-16 (Auditor General, 2007).According to the CDA, the direct cost of diabetes in Canada amounted to $5.6 billion in 2007 and combined with indirect costs rose to $17.4 billion (CDA, 2009b). In comparison, cardiovascular disease, the second highest expense to the healthcare system and a comorbidity of diabetes costs $22.2 billion annually (CHHS, 2009).

Briefly, the growth in prevalence of Type 2 diabetes and its comorbidities are becoming a major drain on Canada's healthcare system. In the next section, I describe some of the causes of Type 2 diabetes and the techniques that help reduce its prevalence and severity.

4: Type 2 diabetes causes and interventions

In this section I first briefly discuss how genetics can play a role in diabetes and then I describe the environmental factors associated with Type 2 diabetes. I then present the empirical findings on affect of the environmental factors on Type 2 diabetes prevalence. The last sub-section details the theory of Type 2 diabetes prevention and management techniques.

4.1   Genetic Makeup

A person is more likely to develop Type 2 diabetes if he/she has a genetic predisposition or family history of diabetes. Genetic resistance to insulin, which helps generate energy in one's body, and tendency of abdominal (central) obesity, are associated with development of Type 2 diabetes (Chowdhury et al., 2003). Scientists are not certain about the exact genes that are responsible for elevated insulin in certain individuals. An example of a gene component that may contribute to insulin resistance is PC-1; Barnett et al. (2006) hypothesise that this gene component may affect the body's ability for insulin signalling and therefore block insulin action . Although genetic susceptibility is a contributing factor to diabetes development, it does not cause the high levels of Type 2 diabetes seen today.

4.2   Environmental Factors

Even though genetic predisposition may lead to increased susceptibility to Type 2 diabetes environmental factors or lifestyle choices play a large role in the development of Type 2 diabetes. Zimmet (1982) conducted an epidemiological review of studies on the causes of Type 2 diabetes. In the review he finds that the lowest rates of diabetes prevalence (> 2%) were reported among Eskimos, Alaskan Athabascan Indians, populations of Japan, China, Indonesia and the Indian sub-continent compared to a high prevalence of diabetes (< 35%) among American Pima Indians and the

Micronesian population of Nauru. But, despite low prevalence rates in their place of origin some populations show a marked increase in diabetes prevalence after a change in their living environments. Cohen et al. (1961) compared new-immigrant Yemenites and new-immigrant Kurds with old settlers of the two ethnic groups in Israel and find a higher prevalence of diabetes in the old settlers. But when the 'new immigrant Yemenites' were studied 20 years later, the diabetes prevalence had increased from 0.06% to 11.1%. In another study Kawate et al. (1980) find that Japanese migrants and their children in the USA had a higher prevalence than Japanese living in Hiroshima. In a study on the effect of migration to urban Indian centers, Gupta et al. (1978) find that the prevalence of diabetes among people living in rural Indian areas is 1.2 % while among those living in urban areas it is 67% higher at 2.0%. Prior and Davidson (1966) also studied the effect of rural-urban migration among Polynesians on the Cook Islands and find a 2.4% diabetes prevalence among rural Polynesians compared to 5.7% among those living in urban areas.

A change in environmental factors such adoption of a sedentary lifestyle (characterized by a lack of physical activity), an unhealthy diet, and a lack of understanding of diabetes influence the prevalence of diabetes. This sub-section draws the link between these factors and Type 2 diabetes. An active lifestyle is essential component of Type 2 diabetes prevention. The Public Health Agency of Canada recommends 30 to 60 minutes of daily physical activity to protect against metabolic diseases such as Type 2 diabetes (Public Health Agency, 2003). Any physical activity such as going up and down staircases counts towards the 30 to 60 minutes a day. While physical activity is essential for burning off excess calories, eating healthy in order to avoid excessive calorie intake is equally highly recommended. The Canada Food Guide recommends that at a minimum one must reduce caloric intake from high fat foods and eat between 5 and 10 servings of fruits and vegetables a day (Healthy Living Alliance, 2009). Not making healthy lifestyle choices for diet and exercise lead to overweight and obese populations. A person with a body mass index (BMI) between 25 and 30 is characterized as being overweight and above 30 as being obese; both overweight and obese individuals are at increased risk of developing diabetes and related complications (Raine, 2004).

Awareness about what causes diabetes and how it can be prevented is pivotal to reducing Type 2 diabetes prevalence and it comorbidities. Heart disease is a comorbidity of Type 2 diabetes. In a study of Indo-Canadian men with heart disease, Bedi et.al (2008) find that the patients had difficulty identifying the risk factors associated with their condition. The patients delayed seeking medical help since they did not recognize the symptoms related to heart disease and were unable to articulate effectively their medical concerns to health practitioners. The lack of understanding of the risk factors of Type 2 diabetes and its comorbidities makes vulnerable populations more susceptible to the disease.

4.3   Prevention and Management techniques for Type 2 diabetes

The techniques to mitigate the effects of genetic predisposition and environmental factors, on Type 2 diabetes prevalence, fall into three categories: primary, secondary and tertiary intervention. Primary intervention aims to reduce the risk of developing diabetes. This level of intervention focuses on addressing environmental factors by increasing the general population's level of physical activity and fibre intake and reducing its caloric and fat intake (Auditor General, 2004). Secondary intervention prevents people who are pre-diabetic, i.e. those with higher than recommended blood sugar levels, from developing diabetes (Davachi et al., 2005). An example of such an intervention is frequent individual contact with coaches, a structured 16-session core curriculum and supervised physical activity (Auditor General, 2004). Tertiary intervention help prevents or delay the long-term complications of diabetes. Regular monitoring of Type 2 diabetes patients to prevent complications such as blindness, end-stage renal disease (ESRD), and lower extremity amputation are examples of tertiary intervention (Auditor General, 2004).

In summary, the increasing prevalence of Type 2 diabetes and its comorbidities due to unhealthy diets, inadequate physical activity and lack of understanding of diabetes can be reduced with the right level of intervention. In the next section, I discuss how above-mentioned risk factors affect my target demographic of South Asians in Metro Vancouver.

5: South Asians and Metro Vancouver

In this section, I discuss the status of diabetes among South Asians, how genetic and environmental factors contribute to diabetes among South Asians, and reasons why I chose Metro Vancouver as the scope for my capstone.

5.1 Diabetes prevalence among South Asians

Diabetes is a highly prevalent condition among South Asians (SA).[4] Barnett et al. (2006) find that, in comparison to indigenous populations in the UK, South Asians become diabetic at a younger age and their overall of risk of Type 2 diabetes is four to six times higher. In another comparison, Rankin and Bhopal (2001) find that while the prevalence within the UK is respectively 1.0, 3.2 and 1.3 percent among people of European, Chinese and Afro-Caribbean descent, people of SA descent experience a rate of nearly 4.8 percent. Health Canada also recognizes South Asians as a population at high-risk of diabetes along with Aboriginal peoples and people of Chinese, Latin American and African descent (Watson et al., 2007).

In a Canadian study of 985 subjects of South Asian, Chinese or European descent, Anand, et al. (2000) find that of the total 342 South Asians 6.2 percent identified themselves as diabetic upon entry into the study compared to only 2.6 percent of Chinese and 2.2 percent of Europeans. The prevalence of diabetes among South Asians is two and a half times higher than that observed among Chinese. When comparing diabetes- related mortality rates between SAs, Chinese and Europeans, Sheth et al. (1999) find that SAs are twice likely as Europeans and three times as likely as Chinese to die of diabetes (Sheth et al., 1999).

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[4] For the purposes of this study, South Asian refers to someone who either immigrated from, or whose ancestors immigrated from, India, Sri Lanka, Fiji, Pakistan, or Bangladesh to Canada; i.e. he/she is of South Asian descent but may not be born in South Asia.

5.2   Causes of Diabetes among South Asians

Genetic predisposition to higher abdominal obesity and insulin resistance are contributing factors towards higher prevalence of Type 2 diabetes among South Asians (Barnett et al., 2006). In their study about the link between ethnicity, abdominal obesity and insulin resistance, McKeigue and Shah (1991) find that in comparison to their European counterparts, South Asian men and women had higher levels of central obesity and insulin resistance. Even though genetic determination plays a role in elevated levels of obesity and insulin resistance, environmental factors can help counterbalance the genetics to help prevent the onset of diabetes.

A lack of exercise, high intake of fatty foods, lack of understanding of diabetes lead to a high prevalence of Type 2 diabetes among South Asians. The first environmental factor is lack of exercise among South Asian populations living in technologically advanced western countries. Advancement of technology has led to mechanization of many activities that helped people exert themselves physically and stay active. For example, people can drive their cars instead of walking to their destinations. In a study comparing South Asians living in the UK to people of European descent, McKeigue and Shah (1991) find that the higher level of insulin resistance is more closely linked to lower levels of physical activity among South Asians than among Europeans.[5]

Second, the level of fat and carbohydrate intake is directly related to risk of Type 2 diabetes (Barnett et al., 2006). Immigrants, or those who have migrant origins, do not adopt the diet of the country they migrate to but stick to the diets from their home countries. In a qualitative study of Bangladeshis living in British Columbia, Chowdhury et al. (2000) find that the diet of the respondents is based on cultural and religious customs of the home country and not on recommended dietary intake for good health. Foods rich in fats and carbohydrates which are considered 'special menu items' in the home country become 'everyday menu' items for the respondents and lower than recommended levels of fruits and vegetables are consumed.

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[5] Some migrants from South Asia may have a high standard of living at home that may allow them to lead a more sedentary lifestyle than the average population. They may have Type 2 diabetes symptoms before migration.

Third, language and cultural differences create a lack in understanding of diabetes prevention and management. In a cross-sectional survey of South Asians, living in South Tyneside (UK) Rankin and Bhopal (2001) find that

> "28% people did not understand what the term diabetes meant, 43 (13%) could not provide any description, 75 (22%) were unable to suggest any risk factor and 64 (20%) could not give a preventive measure. Two-thirds of respondents did not understand enough about the conditions to prevent diabetes." (pg 253)

Fagerli et al. (2005) conducted a survey of dietary advice given to diabetic Pakistanis in Oslo, Norway. They find that the participants struggled to understand the advice they received; those with relative fluency in Norwegian could not understand some of the concepts and terms. The communication barrier between patients of SA origins and their healthcare professionals, who often are not South Asian, creates a lack of understanding of diabetes. The lack of understanding of diabetes negatively affects diabetes prevention and management efforts since patients are unable to, or are hesitant to follow the advice given to them.

A lack in understanding diabetes and recognizing its symptoms also causes a delay in detection of the disease among South Asians. In their study of SAs living in the UK, Barnett et al. (2006) find that the condition remains undiagnosed in up to 40% of South Asian individuals. Watson et al. (2007) find that 10 percent of South Asians screened in their Canadian study had diabetes but had not known it, compared to an estimated two percent for non-South Asians. Anand et.al (2000) also discover that 28 percent of South Asians versus 20 percent of Chinese and 18 percent of Europeans in their sample were unaware that they are diabetic. The new cases of diabetes are of the Type 2 category. Early detection of elevated diabetes risk in a person is beneficial because it can help prevent the onset of diabetes and its ensuing comorbidities.

5.3 Focus on South Asians in Metro Vancouver

British Columbia is one of the top destinations for visible minorities migrating to Canada. With 262,300 people, the South Asian community is B.C.'s second largest visible minority group, representing 6.4% of the province's total population.[6] As of 2006, 207,200 of the 262,300 SAs reside in the census metropolitan area of Vancouver or Metro Vancouver. The SA population has increased from 8.4 percent of Metro Vancouver's total population, in 2001, to 9.9 percent in 2006. Even though Metro Vancouver has an increasing density of people with South Asian origins, who are more susceptible to Type 2 diabetes, we do not know much about the diabetes prevalence rate among these residents or what can be done to prevent and manage their diabetes.

In summary, the high prevalence of diabetes among South Asians, the lack of information about diabetes among this group, and the demographic shift of Metro Vancouver towards South Asians provide compelling reasons to study how influencing environmental factors can prevent Type 2 diabetes among SAs in Metro Vancouver.

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[6] I gathered the information in this sub-section from Statistics Canada's Census publication- Canada's Ethnocultural Mosaic, 2006 Census (Chui et al., 2008).

6: What is being done to address diabetes in BC

The three agencies addressing the growing prevalence of diabetes in BC are the BC Ministry of Health, BC Ministry of Healthy Living and Sport, and the Canadian Diabetes Association. While the Ministry of Health and Ministry of Health Living and Sport primarily set the agenda for the diabetes strategy, monitoring prevalence and facilitating diabetes prevention through the healthcare system, the CDA's initiatives focus on raising awareness within communities. The BC Auditor General recently reported on the BC Ministry of Health's initiatives to address diabetes.[7] The BC Ministry of Health has the following proposals currently underway to address diabetes:

- Collaboration with the National Diabetes Surveillance System to monitor diabetes prevalence and complications in BC.
- Collaboration with the Ministry of Healthy Living and Sport, BC Healthy Living Alliance, Canadian Diabetes Association, the BC Recreation and Parks Association, The Union of BC municipalities, the BC College of Physicians and Surgeons, the Canadian Cancer Society, and Dieticians of BC to support primary prevention of diabetes.
- Development of an online tool for physicians to recognize and assist diabetic patients.
- Piloting of a Chronic Disease Management (CDM) model that ensures that the patient is diagnosed with diabetes in its early stages and that his/her diabetes is well managed by the doctor (Health Services Ministry, 2004a).
- Development of the BC Health Guide program that patients can access via phones to get information about prevention and management of diabetes.
- Development of a framework- A Framework for Core Functions in Public Health- for detection and management of chronic diseases including diabetes.
- Development of a program to target high-risk health behaviours called ActNow BC to encourage people to make healthy lifestyle choices such as healthy eating and exercising.

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[7] The information regarding the BC Ministry of Health initiatives has been gathered from the BC Auditor General Report 2004-05 and 2007-08 (Auditor General, 2004; Auditor General, 2007)

As part of its Diabetes Strategy, the Ministry of Health has set up diabetes education centres (DEC) at all the hospitals in Metro Vancouver. These centres provide basic information to patients regarding diabetes management. The DEC at the Surrey Memorial Hospital, in Surrey, runs diabetes information sessions once a week in Punjabi for newly diagnosed patients of SA descent (Ghuman, 2009).

The CDA, has setup a Fraser Valley office to focus on addressing diabetes among South Asians living between Burnaby and Hope. The CDA runs Punjabi information sessions, or expos, to spread awareness about the disease among South Asians (Hundal, 2009). Along with running the diabetes information sessions, the CDA has also collaborated with the BC Healthy Living Alliance to bring the Alliance's Food Skills for Families program- information about healthy eating practices- to South Asians. With the help of the CDA, the BC Healthy Living Alliance has translated the information into a culturally relevant DVD, in Punjabi, using examples of South Asian foods (Healthy Living Alliance, 2009).

In 2007, the BC Auditor General audited the Ministry of Health and the various health authorities to determine if they were doing enough at the primary, secondary and tertiary level to address the growing prevalence of diabetes in BC. The BC Auditor General concluded that BC does not have enough measures in place to prevent and manage diabetes on all three levels (Auditor General, 2007).

In summary, even though BC has taken steps to address the growth of diabetes, at all the intervention levels, it has not done enough to address it adequately. In the next section, I describe this capstone's policy problem and the stakeholders associated with it.

7: Policy Problem and Stakeholders

In this thesis, I address the policy question: how can prevention and management help reduce Type 2 diabetes and its related complications in Metro Vancouver? Type 2 diabetes, if left unchecked will create vast healthcare expenditures for Canada, in the future. At present, not enough is being done to prevent and manage Type 2 diabetes among South Asians in Metro Vancouver. A Type 2 diabetes strategy for South Asians is important because Metro Vancouver's demographic is shifting towards migrants of South Asian descent who have a higher prevalence of diagnosed and undiagnosed Type 2 diabetes in other jurisdictions. Environmental factors such as a sedentary lifestyle, unhealthy eating habits and lack of understanding of diabetes due language, cultural and social barriers are responsible for the high diabetes prevalence among South Asians.

Various stakeholders in British Columbia are directly concerned by the policy problem. The Ministry of Health Services, Ministry of Healthy Living and Sport BC, and the Fraser Health Authority are primary stakeholders because they are responsible for formulating, implementing and evaluating the prevention and management strategies of the BC government in relation to Type 2 diabetes in Metro Vancouver. The Canadian Diabetes Association and the Heart & Stroke Foundation are the non-governmental stakeholders in my study because they actively work to lower the prevalence of diabetes and its related complications. I recognize the Ministry of Finance, BC as a stakeholder since it provides all the funding for the government's strategies for diabetes prevention and management.

In the following sections, I describe the data that I use to identify the rate of Type 2 diabetes among South Asians in Metro Vancouver as well as find the environmental factors that affect prevalence. I then describe and evaluate potential policies to decrease prevalence of Type 2 diabetes among South Asians living in Metro Vancouver.

8: Survey Data and Interviews

In this section, I provide a description of my two data sources: first, I describe the Canadian Community Healthy Survey (CCHS), then I describe the interviews of South Asian diabetics from Metro Vancouver.

8.1   Canadian Community Health Survey

The Canadian Community Health Survey is a Canada wide survey run by Statistics Canada. It gathers information about health determinants, health system utilization, and chronic conditions, such as diabetes, among Canadians aged 12 and older. Until 2007, Statistics Canada administered the survey every two years. I use the data from Cycle 3.1, which was run between January 2005 and December 2005 via telephone and personal interviews. The unweighted sample size is approximately 130,000 respondents. The weighted sample represents the total Canadian population (Statistics Canada, 2005).

For this study, I utilize the CCHS questions that ask the respondent whether he/she has diabetes, at what age it was diagnosed, if the diabetes is/was gestational and how soon after diagnosis the respondent was started on insulin. In addition to questions about diabetes status, I use the questions about the respondent's ethnicity, current age, sex, income, education level, fruit and vegetable intake, level of physical activity, height and weight and choice of language when speaking to a doctor. The survey results combine some of the questionnaire responses to derive new variables; for example combining height and weight to get respondent's body mass index.

8.2   Interviews

I conducted semi-structured interviews with health professionals and Type 2 diabetes patients of South Asian descent. I use these interviews to understand the cultural and social norms that affect

the success of diabetes prevention efforts among South Asians in Metro Vancouver. My sample consists of three health professionals and five patients. The first health professional, Harveen Hundal, is the South Asian Diabetes Programs coordinator for the Canadian Diabetes Association (CDA). The second health professional, Karol Ghuman, is a registered nurse practitioner who works with South Asians suffering from diabetes and heart disease. The third health professional, Sunny Gidda, is a pharmacist working with heart disease and diabetes patients of South Asian descent.

The interviews with the health practitioners lasted between 15 minutes and 1 hour.[8] I did not record these interviews using a voice recorder. Table 2 lists the four questions that I asked the healthcare professionals. During the interviews, I asked about their impressions of the dietary intake and exercise regimen of South Asians, who they meet, who either have or are at risk of getting Type 2 diabetes. I asked the professionals whether the patients and high-risk individuals encounter language difficulties when they try to access information about diabetes. I also inquired whether South Asian patients receive culturally appropriate instructions regarding diabetes prevention or management. In my last question, I asked them about the cultural and social barriers, they find, that South Asians living in Metro Vancouver face when trying to prevent or manage diabetes.

Table 2 Interview questions for healthcare professionals

1	Do you find that the pre-diabetic and diabetic South Asians you meet have a healthy dietary intake and exercise regimen?
2	Do the patients and individuals have language difficulties when trying to access diabetes related information?
3	Are South Asian diabetes patients able to adapt the dietary instructions into what is culturally appropriate for them?
4	What cultural and social barriers do South Asian diabetes patients face when trying to prevent or manage diabetes?

To get individual accounts of people who have diabetes, I contacted Type 2 diabetes patients who attend a health information class for South Asians that Karol Ghuman organizes. People

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[8] I did not record these interviews using a voice recorder. For affiliations of the healthcare professionals see Appendix A, Section A.1

attending the class had suffered a heart condition and many of them had Type 2 diabetes. I requested

to speak to them about their diabetes and conducted the interviews via telephone.

Each interview lasted approximately 10 minutes each. To get better data accuracy, I

conducted the interviews in Punjabi, a South Asian language that all the participants spoke. I recorded

these interviews using a voice recorder. The interviews consisted of eight questions listed in Table 3.

Table 3 Interviews Questions for Type 2 diabetes patients

1	When did you first find out that you have diabetes?
2	Did you start taking insulin or any medicines for your diabetes? When did you start taking it?
3	Are you able to find information about diabetes care easily?
4	What source of information has been most useful to you in understanding diabetes management: the heart health classes, the doctor, the hospital?
5	Did you have to change your diet after being diagnosed? Was it easy to change it? What changes did you make?
6	How much exercise do you do on a daily basis?
7	What is the highest level of education you completed?
8	Do you face any cultural barriers when trying to manage your diabetes?

In my interviews with the diabetes patients, I asked how long ago they were diagnosed. To find out

the severity of the condition, I asked if they take insulin or diabetes medicines to control their blood

sugar level. I asked about their diet and exercise regimen. In one of my questions, I enquired about

what avenue is most useful for them to find information about diabetes management, for example,

hospitals, doctor's office or health information class. To find out if the patients face language barriers

I asked if they follow the recommended guidelines of reducing fat intake and exercising. In order to investigate if the patients face cultural barriers to following advice I asked if they are able to follow the recommended dietary guidelines and still eat ethnically appropriate foods.

In summary, I use the Canadian Community Health Survey data from Statistics Canada, and interview data of healthcare professionals and South Asian diabetics living in Metro Vancouver, to find solutions to my policy problem. In the next section I present the results of analysing the CCHS and informational interviews.

9: Data Analysis

In this section, I describe the results of analysing the CCHS using cross tabulation. I then provide an account of the interview of South Asians diabetics living in Metro Vancouver.

9.1   Cross tabulation of CCHS

The cross tabulation sample consists of Canadians of South Asian and Chinese descent. I conduct the cross-tabs using six patient characteristics: obesity, physical activity, diet, language barriers, gender and age.

9.1.1   Sample Description

My sample consists of people of South Asian and Chinese descent. Similar to South Asians, people of Chinese descent are at high-risk of becoming diabetic. In addition, like South Asians, the Chinese are originally from a developing country in the same region. I therefore use people of Chinese descent as a comparator group against South Asians, to determine the effect of environmental factors on Type 2 diabetes among South Asians. The weighted sample consists of 808,760 South Asian and 905,177 Chinese Canadians. Of this sample, 142,040 South Asians and 292,450 Chinese reside in Vancouver. Due to data constraints, I conduct my analysis using the Canada wide sample.

The CCHS does not differentiate between Type 1 and Type 2 diabetes, and I use questions on diagnosis date, for diabetes, to determine whether the respondent has Type 2 diabetes. If the respondent reports that he/she was diagnosed with diabetes as a child or teenager and was started on insulin within a month, I classify the respondent as having Type 1 diabetes. If the person was diagnosed as having diabetes only for the duration of her pregnancy, I classify it as gestational diabetes. I categorize all the remaining diabetes patients as having Type 2 diabetes.

My sample has 50,217 South Asians and 15,546 Chinese respondents with Type 2 diabetes. The prevalence rate is 6.21 percent among South Asians and 1.73 percent among the people of Chinese descent; and the prevalence among South Asians is 3.6 times higher than among the Chinese. The prevalence is even higher within Metro Vancouver. Type 2 diabetes rate among South Asians living in Metro Vancouver is 8.4 percent compared to the prevalence rate among Chinese people at 2.0 percent; thus, the prevalence rate is 4.2 times higher among South Asians than among Chinese.

Not only do more South Asians have Type 2 diabetes, they are also afflicted by it sooner. Table 4 presents a comparison of the demographic characteristics of diabetes patients versus those of the general Chinese and South Asian population. About 9.1 percent of the SA diabetic sample falls below age 40 whereas there are no diabetics of Chinese descent in that age group.

Table 4 Profile of people with Type 2 Diabetes and the General South Asian and Chinese population (%)

	Diabetic Population		General Population	
	South Asians	**Chinese**	**South Asians**	**Chinese**
AGE				
Less than 14	0.0	0.0	2.8	3.9
14-39	9.1	0.0	55.2	49.9
40-49	25.3	12.4	20.6	21.8
50-59	30.8	32.6	11.0	13.1
60 and above	34.8	55.0	10.4	12.1
Insulin				
Use Insulin	30.7	14.2	**Not Applicable**	
Gender				
Male	65.8	52.3	51.2	46.6
Education				
Any Postsecondary	58.1	47.1	64.2	66.9
Income				
$50,000 or more	44.1	31.6	58.8	56.5

People aged 40 and above are over-represented in the diabetic population. Among South Asians, people aged 60 and above are most over-represented; even though they make up just 10.4 percent of

the general population, they constitute over a third of the diabetic population. Among people of Chinese descent, the 60 and above age group makes up 12.1 percent of the general Chinese sample but constitutes 55 percent or over half the Chinese diabetic sample. This finding is not surprising because Type 2 diabetes is more prevalent among people in higher age brackets due to a lifetime influence of environmental factors. The disease is also more severe among South Asians since a higher percentage of Type 2 diabetics of SA descent take insulin, which is required for advanced stage diabetes than people of Chinese descent. Across Canada, 30.7 percent of Type 2 diabetes patients of SA descent take insulin compared to 14.2 percent of Chinese.

The South Asian and Chinese samples also vary considerably by gender, education and income. A higher proportion of the SA diabetics sample is comprised of males as compared to the Chinese diabetic sample. Comparing the SA and Chinese diabetic sample to their respective general populations strengthens this finding. I find that while SA men make up just over 50 percent of the general population, they make up 65.8 percent of the diabetic population. Among people of Chinese descent, while men are under-represented in the general population they make up slightly more than 50 percent of the diabetic population.

The South Asian diabetic sample has higher proportion of people with post-secondary education. In the SA sample 58.1 percent of people with diabetes have some form of post-secondary education as compared to the Chinese sample in which 47.1 percent of diabetics have post-secondary education. In the general population the education level among the Chinese and South Asians is comparable with 64.2 percent of South Asians and 66.9 percent of Chinese who have some form of post-secondary education. Similar to education a larger proportion of the South Asian diabetics report higher household income than Chinese people do. While 44.1 percent of diabetic SAs reported income of 50,000 or more, among Chinese, only 31.6 percent reported income of $50,000 or more. Approximately similar percentages (i.e. 58.8 percent of South Asians and 56.5 percent of Chinese) report a household income of $50,000 or more.

In summary, not only is Type 2 diabetes much more prevalent among South Asians compared to people of Chinese descent it is also more severe among South Asians. Compared to the general population, males and people aged 40 and above are over-represented in both the South Asian and Chinese diabetic sample.

9.1.2 Cross Tabulation Characteristics

As described in Sections 4 and 5 obesity and environmental factors such as an unhealthy diet, lack of physical activity, lack of understanding of diabetes increase the risk of Type 2 diabetes. CCHS data in Section 9.1.1 show that most South Asians with diabetes are over 40. The data also shows that more males than females are afflicted with diabetes. Using the information about environmental factors and prevalence, I chose six characteristics to conduct the cross-tabulations described in Table 5- Obesity, Physical Activity, Diet, Language Barriers, Gender and Age.

Table 5 Characteristics, related hypotheses and measures

Explanatory Variable	Hypotheses	Measure	Benchmark
Obesity	(+)	Body Mass Index greater than	25 kg/m^2
Physical activity	(-)	Minutes of Physical Activity in a day	30 minutes of physical activity/day
Diet	(-)	Intake of Fruits and Vegetables	5 fruits and vegetables a day
Language barriers (Lan)	(+)	If respondent speaks to doctor in English or in their own language	Speaking in Chinese or a South Asians language with doctor
Male Gender	(+)	Male or Female	Male
Age	(+)	Age at which diabetes was diagnosed	

I use Body Mass Index (BMI) as a measure for obesity. As described in Section 4, BMI of more than 25 kg/m^2 increases a person's risk of becoming diabetic. For physical activity, I use the 30

minutes of activity a day as a benchmark. As indicated in Section 4, the Public Health Agency

recommends a minimum of 30 minutes of physical activity a day. My measure for dietary intake is

fruits and vegetables. A person with less than 5 servings of fruits and vegetables is at an increased risk

of being diabetic. I use language barriers to measure cultural barriers a person faces when trying to

manage their diabetes. The measure, for analysis, is whether a person speaks to his/her doctor in

his/her mother tongue or in English. Finally, I use age and gender to analyse the higher prevalence of

Type 2 diabetes among males and people over the age of 40. Throughout, I compare the high-risk

behaviours of South Asians with Chinese diabetic patients.

9.1.3   Results

This section details the results of the cross tabulations for South Asian diabetics versus

Chinese diabetics. Before the cross tabulation results I provide characteristics of the general South

Asian and Chinese populations. I then conduct the cross tabs by first using BMI as the main variable

and then using Physical Activity as my primary variable. I then further cross-tabulate obese and

overweight SAs who have no daily physical activity with more descriptive and behavioural variables

As Table 6 shows, among the general population a higher percentage of SAs than Chinese are

either overweight or obese. Many more South Asians than Chinese speak to their doctor in English,

which could be because the British whose primary language of business was English colonized many

Table 6 Characteristics of General population including people with diabetes (%)

	South Asians	Chinese
BMI		
Overweight or Obese	34.7	20.0
Language		
Speak English to doctor	81.6	51.7
Physical Activity		
< 30 mins/ day	65.2	69.8
Fruit and Vegetable Intake		
< 5/day	60.8	65.9

South Asian countries. A slightly higher percentage of Chinese people compared to South Asians exercise less than 30 minutes, 69.8 percent versus 65.2 percent, and eat less than 5 servings of fruits and vegetables a day, 65.9 percent versus 60.8 percent.

Table 7 shows the results of the first set of cross-tabs using BMI as the main variable. I find that a higher percentage of SAs suffering from diabetes are male and speak to their doctor in English compared to the Chinese population. In my sample, 65.7 percent of obese SA diabetics are male compared to 54.5 percent among people of Chinese descent. In addition, 82.5 percent of SAs with high BMI speak to their doctor in English compared to 68 percent of Chinese respondents; thus indicating that not understanding and following the doctor's guidelines to reduce weight may be responsible for obesity. These results are similar to the general population frequencies discussed in the preceding paragraph.

I also find that overweight or obese SA diabetics are more likely to perform less than the recommended minimum physical activity and eat less than the recommended fruits and vegetables a day. However, while the difference between percentage of SA and Chinese diabetics who perform less than 30 minutes of physical activity a day is high (i.e. 63.5 percent versus 43.9 percent) the difference between percentage of SA and Chinese with inadequate fruit and vegetable intake is relatively small – (60.8 percent versus 57.6 percent). The exercise level and fruit and vegetable intake of SA diabetics is highly comparable to the general South Asian population from Table 6. In comparison, a higher proportion of diabetics of Chinese descent who are overweight or obese exercise more and eat more fruit and vegetables than in the general population. These results show that not only do a higher percentage SA diabetics have high risk behaviours and are therefore worse off than their Chinese counterparts, the percentages are not better than the general SA population which is not diabetic. The lack of difference between the general and diabetic SA population corroborates the findings of the language cross tab, which point towards patients not understanding, or not following health guidelines.

Table 7 Cross Tabulation results for main variable Body Mass Index (%)

	Sex		Language		Physical Activity		Fruit & Vegetable Intake	
	Male		Speak English with doctor		< 30 mins/ day		< 5/day	
	SA	Chinese	SA	Chinese	SA	Chinese	SA	Chinese
Overweight or Obese	65.7	54.5	82.5	68	63.5	43.9	60.8	57.6
South Asians with BMI > 25 and Physical Activity < 30 mins/day								
	Males		< 5 Fruits and Vegetables/ day		English Speaking			
	69.8		82.2		86			

To get further insight into the behaviour of overweight or obese people, I calculate the frequencies for South Asians who have a high BMI and do not perform the recommended level of exercise to determine concerns among this demographic. I find that, similar to the main diabetic sample, for SA diabetics with BMI > 25 and physical activity < 30 minutes a day, males constitute the majority of the group. They form 69.8 percent of the sample. The fruit and vegetable intake is much worse in this sub-group than the main SA diabetic population; 82.2 percent of people eat less than five fruits and vegetables a day compared to 60.8 in the main sample. The percentage of the sub-group that speaks to their doctor in English is slightly higher at 86 percent compared to the main sample in which 82.5 percent speak English. Therefore, overweight of obese diabetic people have the same characteristics as the main SA diabetic population, except in their diet, which is much worse.

Table 8 Cross Tabulation Results for main variable Physical Activity (%)

	Sex		Language	
	Males		Speak English with doctor	
> 30 mins Physical Activity/ Day	SA	Chinese	SA	Chinese
	61	42.7	51	49.6
South Asian males with Physical Activity < 30 mins				
	< 5 Fruits & Vegetables/ day			
	74.9			

To find out if health behaviours are consistent with reported BMI, I conduct further cross tabulations for SA and Chinese diabetics using physical activity as the main variable. The findings in Table 8 show results similar to those for BMI cross tabs. South Asian males who have diabetes are less likely to be physically active than their Chinese counterparts. Among SAs, 61 percent of people who reported less than the recommended level of physical activity are male as opposed to 42.7 percent in the Chinese sample. The majority, 74.9 percent, of SA males with low physical activity also have less than the recommended fruit and vegetable intake. Similar to the BMI cross-tabs, the language results for the two ethnicities, in Table 8, are comparable. Approximately half of the people in the SA and Chinese diabetic sample, who performed less than 30 minutes of daily physical activity, spoke to their doctor in English.

In summary, the CCHS analysis shows that SA diabetes patients are more likely not to following diet and physical activity guidelines than Chinese diabetic patients. They exercise less than the recommended minimum 30 minutes a day and eat less that the recommended 5 fruits and vegetables a day, especially when obese. The survey shows that majority of the patients are male. The analysis also indicates that majority of the people who are not following the recommended guidelines are speaking to their doctors in English thus indicating that they are not completely understanding the guidelines provided, a finding which is corroborated by comparison of the diabetic population to the general population. In the next sub-section, I present the findings from the informational interviews.

9.2   Interview Results

The interviews help me complement information gathered from the cross-tabular analysis. The purpose of the interviews with the 5 patients and 3 healthcare professionals is to verify the CCHS analysis results. There is also an emphasis on the need for a culturally sensitive approach. According to Harveen Hundal and Karol Ghuman, many Type 2 diabetes patients of SA descent fail to follow the recommended diet and exercise guidelines. South Asians have a high propensity to consume high fat items, such as deep fried fritters and sweets. South Asians hold a high number of large social events where various banquet halls cater food. The catering companies provide food that contains full fat

milk, and products made of ingredients such as cream and butter. The hosts do not provide healthy food options at such events because they fear that people attending the event might think that the hosts do not have enough money to provide full fat food, which is more expensive and therefore is a status symbol. When healthcare professionals give people advice about food consumption, it pertains to food eaten by Westerners and therefore people are not able to translate it into advice on South Asian food. Finally, since a large number of South Asians have the disease, they see it as a regular part of growing older and not as something that they can avoidable. There is thus a general disinterest in engaging in dialogue about diabetes and therefore it is difficult to disseminate information.

Both Harveen Hundal and Karol Ghuman point out that information dissemination is difficult. According to the former, the Punjabi information sessions run at the Diabetes Education Centre (DEC) at the Surrey Memorial Hospital is only for people who have recently been diagnosed with diabetes. People who are pre-diabetic and those who have had diabetes for a long time are not offered this service. Karol Ghuman mentions that the wait time to attend a DEC session in Punjabi can be up to three months long; too much information is condensed into a small amount of time; and many times people do not attend the sessions since they do not have means of transportation. Harveen Hundal of the Canadian Diabetes Association has also experienced difficulties when trying to spread awareness about diabetes through information sessions. She says it is very challenging to hold the information sessions because community attendance is small and the sessions are very expensive to organize. Sunny Gidda, the pharmacist, points to a lack of proper communication between patients and their doctors. He mentions that patients often do not know what questions they must ask their doctors. Patients have difficulties with English vocabulary related to the disease and they do not make the connection between their diet and exercise and the comorbidities of diabetes. In addition, some doctors do not spend enough time with their patients to provide them with adequate guidelines for preventing or managing diabetes. Karol Ghuman reports that interview Participant 2, who was not offered proper advice about diabetes management, starved himself to control his blood glucose levels instead of eating moderate amounts of food at regular intervals, and had thus caused his health further damage.

Type 2 diabetes, patients whom I interviewed, gave more information about solutions for

Table 9 Patient interview responses

	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Gender	Female	Male	Male	Male	Male
Age	58	53	58	61	62
Highest education level	Some post-secondary	Some post-secondary	High-school	High-school	High-school
When diabetes was diagnosed	2005	2005	1992-1993	1999-2000	1973
BMI	Obese	Normal	Normal	Normal	Overweight
Insulin medication used	Yes	Yes	Yes	Yes	Yes
Access to information	Not easy	Does not know where go to get information	Easy	Easy	Easy
What information source is most useful	Heart health information classes	Advice from hospital was most useful	The doctor	Heart health information classes	Heart health information classes
Follow the recommended diet	No	No	Yes	Eats suggested level of fruits, vegetables and fibre but eats fried food sometimes	Yes
Physical activity	Below the recommended level	Below the recommended level	60 minutes	30-45 minutes	Meets the recommended level
Any cultural barriers	No	Healthcare workers are cooperative	Punjabi healthcare workers are easy to understand	No, family assists if he does not understand information in English	No, Punjabi healthcare workers keep in mind that he is SA

diabetes management that I present in Table 9. Only one of the five interviewees, Participant 1, is female. The age distribution is between 53 years and 62 years. The education level ranges between high school completion and post-secondary education. Participant 1 and her husband Participant 2 were diagnosed with diabetes in 2005. All the other patients were diagnosed with Type 2 diabetes more than a decade ago. Participant 1 is obese, Participant 2,3, and 4 are normal in weight and Participant 5 is overweight. All patients are taking medicines to manage their diabetes.

The newer patients, Participant 1 and 2, reported that they did not know where they were supposed to go to find information about diabetes. The patients who were diagnosed more than a decade ago, Participants 3, 4 and 5 reported following proper self-management procedures by having a healthcare professional check their blood glucose levels, exercising, and eating healthy.

All the interviewees are from an information class setup to explain to SA patients who have had some form of cardiovascular incident, such as a heart attack, about healthy lifestyle choices. By being in the class, the interview participants said that they were obtaining information most relevant to them. In particular, they report finding the dietary advice pertaining to traditional South Asian food helpful. The dietician provides the advice in Punjabi using visual depictions of food eaten by South Asians. Participant 2 mentions the usefulness of the information class by making the following comment:

> They tell us that how much nutrition a *roti* has compared to bread, how many calories there are. I like how the information provided is specific to East Indians.

During the interviews, all the respondents mentioned that the advice given to them in Punjabi was easy to understand and that they were able to implement it.

Summary

The interviews with the healthcare professionals indicate information dissemination among the South Asian community is difficult. The professionals indicate that patients find it difficult to reach information sessions due to lack of transportation options. Often times people are not aware that Type 2 diabetes can be avoid and they take it as a result of growing older. The interviews indicated a

need to build a stronger patient doctor relationship in which patients are knowledgeable about what questions they should be asking, and doctors provide the patients with accurate and adequate information. Furthermore, the interviews with South Asian patients show that advice given in a culturally appropriate manner, for example discussion on South Asian food instead of North American food, does inspire confidence among patients about managing their diabetes. Patients receiving such advice follow the recommended guidelines for diabetes management.

The analysis of the interview and survey data highlights two priority areas for policy options. Priority 1 is to increase awareness among South Asians about the causes and prevention and management methods of Type 2 diabetes. Priority 2 is to improve their dietary intake and increase their level of physical activity.

10: Policy Goals and Criteria for Measurement

In this section, I discuss the policy goals, the analysis criteria and measures that I use to evaluate my policy alternatives. The criteria measure whether stated policies help in prevention and management of Type 2 diabetes among South Asians, living in Metro Vancouver, by investigating if they meet their policy goals.

The long-term goal is to reduce the number of new cases of Type 2 diabetes diagnosed among South Asians each year to a level below the Canadian average; i.e. to have less than 1557 more South Asians diagnosed with Type 2 diabetes each year.[9] Since Type 2 diabetes is irreversible, reducing the number of new patients will keep the population of patients smaller than it would be without preventative measures. To meet the long-term policy goal I have two short-term goals. The short-term policy goals are to have more than 50% of South Asians who are pre-diabetic or diabetic, consuming 5 or more servings of fruits and vegetables, and exercising more than 30 minutes a day. The results of the survey analysis indicate that 60.8% of South Asian Type 2 diabetes patients, who are obese, eat less than 5 servings of fruits and vegetables a day and 63.5% of obese South Asians with diabetes exercise less than 30 minutes a day. The short-term goal will improve these high-risk behaviours among South Asians.

I use four criteria to evaluate whether the policy alternatives achieve the above stated goals. These are (i) Cost, (ii) Administrative feasibility, (iii) Effectiveness, and (iv) Acceptability in the community. I rate all the policies equally.   Table 10 provides details about the criteria and their associated measures. Ranking is of high, medium and low favourability. A policy gets 3 points for high favourability, 2 point for medium favourability and 1 point for no favourability.

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[9] In 2005-06 there were 1,939,247 cases of diabetes in Canada. Each year 60,000 new cases of diabetes are diagnosed in Canada. Therefore, the rate at which new cases are diagnosed is (60,000/1,939,247) = 3.1 percent. To have the same rate at which new cases are diagnosed among South Asians in Metro Vancouver, each year 50,217 X 3.1%= 1557 new cases must be diagnosed.

Table 10 Criteria and measures for policy evaluation

Criteria	Definition	Measure	Ranking
Cost	Dollars spent to implement a policy	$0<Cost<$5 $5.01<Cost<$10 $10<Cost	High = 3 Medium = 2 Low = 1
Administrative Feasibility	Level of agency coordination needed	Agencies ≤ 3 4 ≤Agencies ≤6 6 < Agencies	High = 3 Medium = 2 Low = 1
Effectiveness	Improvement in diet	70 < FV 41 ≤ FV ≤ 70 0 ≤ FV ≤ 40	High = 3 Medium = 2 Low = 1
	Increased exercise	70 < PA 41 ≤ PA ≤ 70 0 ≤ PA ≤ 40	High = 3 Medium = 2 Low = 1
Community acceptability	Whether the policy stakeholders support the policy	71 ≤ CA ≤ 100 41 ≤ CA ≤ 70 0 ≤ CA ≤ 40	High = 3 Medium = 2 Low = 1

The first criterion, Cost, indicates how much the stakeholders have to spend to implement a policy successfully. Tobacco control and behavioural modification for Type 2 diabetes both require government to raise awareness about the adverse affects of tobacco use and unhealthy eating and inactive lifestyle. I thus use the spending on intervention efforts to curb tobacco use as benchmark for cost. In an open letter to the Select Standing Committee on Finance and Government Services, Bobbe Wood of the Heart and Stroke Foundation and Scott McDonald of the BC Lung Association state that in 2007/08, the BC government budgeted $5.5 million for tobacco control spending to target the 638,000 BC individuals that smoke. This amounts to $8.62 per smoker. Since the target population for the policies are South Asians living in Metro Vancouver I use the benchmark of $8.62 per South Asian. A policy that costs between $0 and $5 is highly favourable while a policy costing between $5.01 and 10 has medium favourability. Any policy costing more than $10 per South Asian has low favourability.

The second criterion, Administrative Feasibility, measures the ease with which current administrative capacity can be remodelled to accommodate management of proposed policies. Presently, four agencies: the Ministry of Health, Ministry of Healthy Living and Sport BC, Fraser Health Authority and the Canadian Diabetes Association collaborate with each other for diabetes prevention and control efforts. Therefore, I use 4 agencies as my benchmark for administrative feasibility. Policy requiring 3 or less agencies to coordinate is highly favourable, policy requiring coordination between 4 and 6 agencies has medium favourability and policy involving more than 6 agencies has low favourability.

The third criterion that I use to evaluate the policy alternatives is Effectiveness. A policy is effective if it helps achieve the short-term policy objectives. I break down effectiveness into two measures: fruit and vegetable intake and physical activity. To weight Effectiveness as equal to the other three criteria I take the average of its two measures. The first effectiveness measure is increase in fruit and vegetable intake (FV). A policy should help 50 percent of South Asians who are pre diabetic, or diabetic, to increase their fruit and vegetable intake to 5 or more servings a day. A policy that increases FV of 70 percent or more people is highly favourable, if it increases FV for 41 to 70 percent of people it has medium favourability and finally, if it increases FV of 0 to 40 percent of people then it has low favourability.

The second effectiveness measure is increase in physical activity (PA). Similar to FV intake, a policy should help 50 percent of South Asians who are pre diabetic, or diabetic, to increase their PA to more than 30 minutes a day. A policy that increases physical activity of more than 70 percent of people is highly favourable; if it increases activity of 41 to 70 percent of people then it has medium favourability. If the policy increases physical activity of 0 to 40 percent of people, it has low favourability.

Finally, criterion four -Community Acceptability (CA), helps identify whether the concerned stakeholders will accept and implement the proposed policy. In total, the policy alternatives have ten stakeholders: Fraser Health Authority, Vancouver Coastal Health Authority, BC Ministry of Health,

Canadian Diabetes Association, BC Ministry of Health, Ministry of Health Living and Sport, physicians in Metro Vancouver, South Asian in Metro Vancouver, 6 Seniors' Centres in Punjabi Temples and Translink. Each alternative has a different number of stakeholders therefore. I determine community acceptability by percentage of stakeholders willing or unwilling to participate in a policy. If 71 to 100 percent of stakeholders agree to participate, the alternative has high CA, and if 41 to 70 percent of stakeholders agree to participate, it has medium CA. Finally, if 0 to 40 percent of stakeholders agree to participate, the policy has low CA.

In summary, in this section, I devise four criteria: Cost, Administrative Feasibility, Effectiveness and Community Acceptability to evaluate the policy alternatives. I weight all the criteria equally. All the policies get a rank of high, medium or low for each criterion. In the next section, I discuss the evaluation of policy alternatives to help increase fruit and vegetable intake and physical activity among pre-diabetic and diabetic South Asians in Metro Vancouver.

11: Policy Alternatives and their Evaluation

In this section, I present three policy alternatives to address Type 2 diabetes among South Asians in Metro Vancouver. I then evaluate these alternatives using the criteria described in the previous section. I end the section with the recommendation of the policy alternative that ranks highest in the evaluation

11.1 Policy Alternatives

The three alternatives that emerged from the survey and interview analysis are Patient Focus, Physician Focus and Population Focus. All three options build on the Status Quo. Although the prevalence of Type 2 is very high among South Asians, I do not focus on policies for the general population primarily because my data covers people who already have Type 2 diabetes. However, the proposed policies have a preventative effect either directly or as a positive externality. The direct effect occurs when the policy is not limited to people with diabetes and people without diabetes can access the service as well. The positive externality happens when people around those receiving the service modify their behaviours upon observing the lifestyle choices made by the patients.Status Quo

The Ministry of Health has set up diabetes education centres (DEC) at all the hospitals in Metro Vancouver. These centres provide diabetes management information to patients. Currently the DEC at the Surrey Memorial Hospital (SMH) that offers Punjabi information sessions to South Asians is the Fraser Health Authority's (FHA) most direct response to Type 2 diabetes among Metro Vancouver's South Asian population. The DEC sessions run once a week and are available only to newly diagnosed patients.

11.1.1 Patient Focus Alternative

This alternative addresses the problem of lack of information about diabetes among patients. It focuses on giving patients the information they need to manage their diabetes or pre-diabetes better. I propose two measures to increase awareness: expansion of the Punjabi information sessions run by FHA and running of information events by the Canadian Diabetes Association (CDA).

The Punjabi information sessions at the DEC in the Surrey Memorial Hospital are held once a week. The BC Ministry of Health should expand this service to the DECs in the 14 other Metro Vancouver cities and district municipalities and offer it twice a week. In order to improve patient accessibility to the sessions, the BC Ministry of Health should collaborate with Translink to provide transportation options for the attendees.

The BC Ministry of Health has previously collaborated with the Canadian Diabetes Association to hold diabetes information events or expositions for South Asians. The CDA should hold the expositions every year. Harveen Hundal mentioned that in order to attract participants, information sessions must have incentives such as free waist measurement tapes, pedometers and free testing of blood pressure and blood glucose and should be held at temples and seniors' centres that people visit on an everyday basis.

The Patient Focus alternative is a secondary intervention technique targeted towards diabetes patients. This alternative incorporates elements of tertiary intervention by monitoring patients' health indicators such as blood pressure and blood glucose. The Patient Focus alternative has the potential of improving risk behaviours among the general population. This positive externality will occur when people around the patients receiving diabetes education change their health behaviours by observing the lifestyle changes of the patient.

11.1.2 Physician Focus Alternative

This alternative focuses on improving the communication between South Asian patients and their doctors. As part of this policy, the ministry should keep the status quo and in addition implement

the Chronic Disease Management model (CDM). Under the CDM model, physicians follow a set of guidelines to improve detection and management of chronic diseases among their patients. Physicians keep a roster tracking the care that he/she has given a patient. The physician records the patient's health status, medications, laboratory tests, awareness session attendance and evaluation after each visit (Health Services Ministry, 2005). To help doctors better educate their patients about diabetes risk factors the Ministry of Health should provide physicians with visuals aids such as plastic depiction of fat content in food, Punjabi DVDs with diabetes management information.

The Physician Focus alternative is a tertiary intervention technique targeted towards diabetes patients. Since it improves monitoring of patient health indicators, this alternative improves management of diabetes as well as its related comorbidities. The Physician Focus alternative will have the direct effect of improving risk behaviours among the general population because although the primary target of the option is people who have diabetes, those who are not diabetic will be able to access the same service under this option. Better monitoring and education will help non-diabetic patients prevent the condition.

11.1.3 Population Focus Alternative

The Population Focus alternative centres on improving physical activity levels among South Asians. As part of the policy, the FHA should maintain the status quo. In addition, the Ministry of Healthy Living and Sport should collaborate with seniors' centres, which are part of Punjabi temples, to start recreation programs for their patrons. Recreation programs should focus on culturally relevant physical activities such as encouraging yoga, cricket and gardening. The physical activity sessions should be held three times each week with the help of the seniors' centre staff. All three activities should be held once a week. In order to give people incentives to participate, the centres should provide its patrons with food that follows Health Canada's guidelines for a healthy diet.

The Population Focus alternative is a primary intervention technique. With this technique, I recognize that the patients are part of a community that is a high-risk population for diabetes. Although the alternative's main target is people who have diabetes, it directly effects the general

population by providing them access to the same services designed for diabetics. The increased access to diabetes prevention services helps improve the overall level of physical activity and dietary intake in the general population.

11.2 Evaluation

In this sub-section, I use the four criteria of cost, administrative feasibility, effectiveness and community acceptability to evaluate the three policy alternatives. Since all my policies build on the status quo, I start by describing its cost. I use a one-year period for the cost calculations.

11.2.1 Cost of Status Quo

There are no numbers available for the cost of running DECs because their funding comes from a general allocation of the Health Authorities. However, since a registered nurse and dietician conduct the Punjabi information sessions at the DEC at SMH I use their annual salaries as an estimate for providing the service. The hourly wage of a registered nurse in BC ranges between \$29.02/hr and \$ 38.10/hr (Nurses Union). The average hourly wage of a registered nurse is:

(\$29.02 /hr + \$ 38.10/hr)/2 = \$33.56/hr

According to the BC Employment Standards Act, a regular workday is 7.5 hours long and a regular work year is a maximum of 50 weeks (Government of BC, 2010, section 32, 35 and 57). Hence, the annual cost of hiring a registered nurse for a year is:

\$33.56 X 7.5 hrs X 50 weeks = \$12,585.00

The hourly wage of a dietician in BC ranges between \$24.05 and \$37.45 (Health Human Resources Advisory Committee, 2001). Thus, the average wage is:

(\$24.05 + \$37.45)/2 = \$30.75

Thus, the annual cost of hiring a dietician is:

\$30.75 X 7.5 hrs X 50 weeks = \$11,531.25

The DEC at Surrey Memorial hospital provides this service all the South Asians in Metro Vancouver. Therefore, the annual cost of hiring a registered nurse and dietician per South Asian is: ($12,585.00 + $11,531.25)/ 142,050 = $0.17.

11.2.2 Alternative 1: Patient Focus

Cost: This alternative has three components for cost. Component 1 is the cost of expanding the status quo while component 2 is the cost of providing transportation to patients to improve access to the DEC's information sessions. Finally, component 3 is the cost of running the Canadian Diabetes Association expositions for South Asians.

First, to expand the status quo I propose that the Punjabi information sessions should be provided at all 15 DECs in the Metro Vancouver area and they should be run 2 days a week. The cost of hiring one nurse and dietician, for a year, is $0.17 per South Asian. Therefore the cost of hiring 15 dieticians and registered nurses for 2 days a week for a year is:

= $.17 X 15 X 2= $5.12/ South Asian in Metro Vancouver.

In addition to expanding the status quo, I propose that the Ministry of Health should collaborate with Translink BC to provide transportation services to patients attending the information sessions. Translink offers transportation services, called Handy Dart, for people with mobility issues. The cost of providing HandyDart services for 10 weeks will be $19 per person (Translink, 2010). Therefore, the cost of providing this service for 50 weeks for all the South Asians with Type 2 diabetes is:

[$19 fare X (50/10) X 50,217 South Asian diabetics]/142,050= $33.58/ per South Asian.

Lastly, I propose that the Canadian Diabetes Association should hold diabetes information expositions every year. In her interview, Harveen Hundal mentions that it costs the CDA $15,000 to hold one information event and it takes up to 3 months to organize the event. Since its takes 3 months to organize an event, the CDA can hold 4 information events a year. Therefore, the cost of holding information events for a year is:

[4 events X $15,000]/142,050 = $.42/per South Asian.

In summary, the total cost of the Population Focus alternative will be $5.22+ $.42 + $33.58 or $39.10 which is much higher than the benchmark of $10 for LOW favourability. I thus rank the option as LOW under the cost criterion.

Administrative feasibility: To provide the Punjabi information services at all the DECs the BC Ministry of Health would have to collaborate separately with the Fraser Health Authority (FHA) and Vancouver Coastal Health Authority (VCH). To provide transportation the Ministry would have to collaborate with Translink. Finally, the Ministry would have to work in partnership with the CDA to hold the diabetes expositions. Each individual measure requires coordination between 2 stakeholders. Since the level of coordination is less than the benchmark of 3 agencies, this option gets a HIGH rank for administrative feasibility.

Effectiveness: In the informational interviews with South Asian Type 2 diabetics, I find that patients getting information at the Punjabi information session follow the recommended diet and exercise guidelines and work to reduce their weight. Tuomilehto (2001) conducted a trial to compare the change in physical activity level and fruit and vegetable intake of diabetic and pre-diabetic individuals when they are given just written and oral information or given individual counselling. Tuomilehto et al. (2001) find that both groups show an improvement in exercise level and fruit and vegetable intake. The group that gets individual counselling shows better outcomes than those that has only written information. Seventy-two percent of people in the counselling group increase their fruit and vegetable intake and 36 percent increase their level of physical activity. Thus, the more intervention a patient receives the better are health related behaviours. Since the change in fruit and vegetable intake is within the benchmark for high effectiveness, I rank it as HIGH for improving diet. Although the intervention increases physical activity of the individual, it does not increase it above the benchmark for low effectiveness; thus I rank the policy as LOW for improving exercise level.

Community Acceptability: Six stakeholders are part of this alternative: the BC Ministry of Health, FHA, CDA, South Asians in Metro Vancouver, VCH, and Translink. The BC Ministry of

Health has previously collaborated with the FHA for the Punjabi information session at SMH and it has collaborated with the CDA to hold awareness expositions. The implementation of these measures indicate acceptability of the policy among the BC Ministry of Health, CDA and FHA.

As I mention in Section 9.2, people wait for up to three months to take advantage of the Punjabi information sessions at the DEC in SMH. In addition, between 2001 and 2004, a community organization in Surrey, called the Progressive Intercultural Society, ran 14 diabetes awareness events at South Asian temples and seniors' centres titled- the Madhumai Project. These events were similar to the proposed CDA information expositions. South Asians participated in these events widely; approximately 692 people attended the 14 sessions (Kaur, 2004). Both these examples indicate that there is a high demand for awareness events among South Asians living in Metro Vancouver.

Not all stakeholders are accepting of the proposed policy. Despite the large population of South Asians, the VCH has not instituted any information classes thus indicating that the VCH is not in favour of offering Punjabi information sessions at DECs under its authority. Currently, Translink offers the HandyDart service only to people with physical and cognitive disabilities and its mandate does not include service to people who have no means of transportation. I use this information as indication that Translink would not be interested in providing mobility services to Type 2 diabetes patients. However, 4 out 6, or 66 percent of stakeholders indicate acceptability of the Patient Focus alternative thus I rank it as having MEDIUM favourability.

11.2.3 Alternative 2: Physician Focus

Cost: The Health Services Ministry (2004a) reports that it pays a physician $75/yr for each patient who is treated under the CDM guidelines. In the worst-case scenario of all South Asians in Metro Vancouver having diabetes the CDM model will cost $75 per SA. This valuation is higher than the benchmark of $10 so I give it a LOW ranking.

Administrative feasibility: This alternative will require coordination between two entities: the BC Ministry of Health services and physicians in Metro Vancouver. Since the coordination level is lower than the benchmark of 3 agencies, I rank it as having HIGH administrative feasibility.

Effectiveness: In a study evaluating the effectiveness of dietary intervention by nurses, similar to the one proposed for physicians, Roe et al. (1994) find that 52 percent of participants have the recommended level of fruit and vegetable intake. Since 52 percent falls within the effectiveness benchmark of 41 to 70 percent, I rank this policy as having MEDIUM effectiveness for improving diet.

Tuomilehto et al. (2001) conduct a trial to find the difference in outcomes between giving patients written and oral information or giving them individual counselling. They find that 16 percent of patients given oral and written information increase their physical activity to the recommended guidelines (Tuomilehto et al., 2001). Since 16 percent falls within the effectiveness benchmark of 0 to 40 percent, I rank this measure as having LOW effectiveness for improving physical activity.

Community acceptability: There are two stakeholders in this policy alternative: The BC Ministry of Health and the physicians. The Health Services Ministry (2004a) reports that approximately 40% of physicians opted into its CDM pilot run in BC, between 2002 and 2004. Running a pilot indicates the BC Health Ministry is interested in instituting a CDM model. However, since not all the physicians opted into the program when given the choice, they may not be willing to participate in it. Since 1 out 2 or 50 percent of stakeholders have shown higher acceptability of the policy, I rank it as MEDIUM.

11.2.4 Alternative 3: Population Focus

Cost: Except for the additional cost of hiring a yoga instructor, this policy uses the existing infrastructure, resources and personnel of seniors centres located in Punjabi temples. The cost of hiring a yoga instructor for a group session is $ 75/hr (Hari OM Yoga Shalu Corp, 2009). There are

six Punjabi temples with seniors' centres in Metro Vancouver (n.a, 2009). The cost of hiring an instructor to hold yoga classes at each of them for a year is:

$75 X 6 temples X 50 weeks = $22,500

Therefore, the cost per South Asian is $22,500/142,050 = $0.16. Since the policy costs less than the benchmark of $5, I rank it as HIGH for the cost criterion.

Administrative feasibility: To ensure that a similar program is implemented at each of the temples, the BC Ministry of Healthy Living and Sport would have to collaborate with all the them. Hence, seven agencies will have to coordinate to ensure a homogenous program at all the temples which is higher than the benchmark of 6. I thus rank this policy as having LOW administrative feasibility.

Effectiveness: With the supervision of a yoga instructor and guided physical activities with centre personnel, people's physical activity level would go up. The Diabetes Prevention Program Research Group (2002) finds that 74 percent of people assigned to supervised training sessions reached the recommended daily physical activity level. Since 74 percent is within the high benchmark for the exercise criterion, I rank it as having HIGH effectiveness for increased physical activity.

Although the alternative contains a nutritional eating component as an incentive for people to participate in the program, it does not provide any information about making healthy eating choices. Without information dissemination about better food choices, participants would not change their diets. Thus, I rank this criterion as LOW for the measure for improved diet.

Community Acceptability: The stakeholders involved in this policy are the Ministry of Healthy Living and Sport, the 6 seniors' temples and South Asians at large. The Ministry has a mandate to promote physical activity and has previously collaborated with community organizations to fulfil its mandate. Therefore, it would be interested promoting physical activity in the South Asian community. During the Madhumai project that I discuss in the Patient Focus alternative, the Progressive Intercultural Society ran yoga classes by trained instructors that we very well attended by

South Asians (Kaur, 2004). I take the attendance as indication that people would be supportive of a program promoting physical activities in their temples.

Although the Ministry and South Asians at large would be supportive of the policy, the temples may not. They may be reluctant to provide their resources for the implementation of this policy and may be reluctant to follow Health Canada guidelines when providing food for the seniors' centre patrons. Thus, 6 of the 8 or 75 percent of stakeholders may not participate in the policy which gives the policy a rank of LOW for community acceptability.

Table 11 Evaluation of Policy Alternatives

Criteria	Definition	Patient Focus	Physician Focus	Population Focus
Cost	Dollars spent to implement a policy	(Low) 1	(Low) 1	(High) 3
Administrative Feasibility	Level of agency coordination needed	(High) 3	(High) 3	(Low) 1
Effectiveness	Improvement in diet	(High) 3	(Medium) 2	(Low) 1
	Increased exercise	(Low) 1	(Low) 1	(High) 3
Effectiveness Avg.		2	1.5	2
Community acceptability	Whether the concerned parties support the proposed policy	(Medium) 2	(Medium) 2	(Low) 1
Total (out of 12)		**8**	**7.5**	**7**

Table 11 present a summary of the policy evaluation in this subsection. The policy most favoured by the evaluation is Patient Focus with 8 points closely followed by Physician Focus. Population Focus alternative scores lower than the other two options due to its lower administrative feasibility and community acceptability.

11.3 Recommendation

The evaluation shows that reduced barriers to information about diet and exercise and increased nutritional awareness helps address Type 2 diabetes risk behaviours among South Asians. I recommend a strong focus on patient knowledge of diabetes self-management. The Punjabi information sessions at the DEC in the Surrey Memorial Hospital should be expanded to other DECs in Metro Vancouver. I also recommend that BC Ministry of Health collaborate with the Canadian Diabetes Association to hold diabetes information events for the South Asian community so that people who are at risk of diabetes also have increased access to information.

12: Conclusion

Type 2 diabetes prevalence in Canada is rising at an alarming rate. The increase in prevalence has increased the cost of the disease on Canada's healthcare budget. Type 2 diabetes does not affect all ethnic populations equally. South Asians and people of Chinese descent are among the populations more susceptible to Type 2 diabetes. In this study, I examine how prevention and management efforts can reduce its prevalence among my target population of South Asians residing in Metro Vancouver. The high density of South Asians in Metro Vancouver creates an ideal condition to study the affect of environmental factors such as diet and exercise on Type 2 diabetes prevalence.

In order to study the policy problem, I make use of the Canadian Community Health Survey Cycle 3.1 and informational interviews with Metro Vancouver South Asians who have Type 2 diabetes. I find that prevalence of Type 2 diabetes among South Asians in Metro Vancouver is 8.4%, which is much higher than the Canadian average of 5.9%. I also find that Type 2 diabetes patients of South Asian descent have unhealthier diets, lower levels of physical activity and a lesser understanding of diabetes compared to their Chinese counterparts. The informational interviews corroborate the findings of the survey analysis and indicate that people are more likely to adhere to dietary and physical activity recommendations if they understand them and are able to adapt them into their cultural context. The interviews also point to a need for improvement of communication between patients and their physicians or healthcare professionals.

Based on the data analysis I formulate three policy alternatives: Patient Focus, Physician Focus and Population Focus. I use four criteria- cost, administrative feasibility, effectiveness, community acceptability to evaluate the alternatives. Based on the evaluation I recommend that Type 2 diabetes prevention and management efforts should be patient focussed. South Asian Type 2 diabetes patients should have greater access to diabetes information sessions in Punjabi. The BC

Ministry of Health should make efforts to improve awareness within the community at large through organizations such as the Canadian Diabetes Association.

South Asians have not been given the medical attention and support they need to stem the rise of Type 2 diabetes in their community. The recommendation provides them with the assistance to first meet the short-term objectives of changes in lifestyle behaviours, which will aid in completing the long-term objective of reducing their Type 2 diabetes prevalence.

Appendices

Appendix: Interviews

A.1. Key Informants

1. Ghuman, Karol- Registered Nurse Practitioner
> Surrey Primary Care Clinic
> Data of Interview: January 11th, 2010
> Place of Interview: Surrey Memorial Hospital

2. Hundal, Harveen- CDA Coordinator of South Asian programs for the Fraser Valley
> Region
> Data of Interview: January 25th, 2010
> Place of Interview: Starbucks, Metrotown, Burnaby

3. Sunny Gidda- Pharmacist
> Data of interview: January 11th, 2010
> Place of Interview: Surrey Memorial Hospital

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