THE DIABETES EPIDEMIC
IN
TRINIDAD & TOBAGO

Attacking A Burdensome Disease
With
Conventional Weapons

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Abbreviations

- ADA ................... American Diabetes Association.
- CDC ................... Center for Disease Control.
- DATT .................. Diabetes Association of Trinidad & Tobago.
- DCCT .................. Diabetes Control & Complications Trials.
- DPP ................... Diabetes Prevention Program.
- DSM ................... Diabetes Self-Management.
- DSME .................. Diabetes Self-Management Education.
- ECG ................... Electrocardiogram.
- FBO ................... Faith-Based Organization.
- FDA ................... Food & Drug Administration.
- FPG ................... Fasting Plasma Glucose.
- HbA1c .................. Hemoglobin A1c.
- HDL ................... High-Density Lipoprotein.
- IRO ................... Inter-Religious Organization.
- LDL ................... Low-Density Lipoprotein.
- MODY .................. Maturity Onset Diabetes of the Young.
- MOH ................... Ministry of Health.
- NAC ................... North America & the Caribbean.
- NAFLD ................. Non-alcohol Fatty Liver Disease.
- NDEP .................. National Diabetes Education Program.
- OGTT .................. Oral Glucose Tolerance Test.
- OOP ................... Out-of-Pocket.
- RHA ................... Regional Health Authority.
- RR ...................... Relative Risk.
- S&S .................... Signs & Symptoms.
- TTHSI ................. Trinidad & Tobago Health Science Initiative.
- WHO ................... World Health Organization.
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Summary

Type 2 diabetes and its complications have reached epidemic proportions in Trinidad & Tobago and are forecasted to get worse. This has dire implications not just for the individual family which must find the resources to deal with a loved one who has gone blind, had a leg amputated, or is in need of dialysis, but for the public purse as a result of burgeoning costs both direct - doctors visits, prescriptions, labs and hospitalizations; and indirect - loss of productive years through death and temporary or permanent disability. These effects are tragic because proven, low cost alternatives are available to prevent this forecast from becoming a sure shot.

Diabetes can be prevented or delayed by (i) changes in diet and lifestyle; (ii) screening for risk or for early management of disease; (iii) treatment of precursor lesions; and (iv) pharmacologic interventions. There are laudable efforts underway in Trinidad & Tobago in respect of (iii) and (iv). Since there is universal recognition that eventual clinical and other desired outcomes are, in fact, highly dependent on how a patient manages his or her diabetes, i.e. self-management, this paper focuses on (i) and (ii). The first section reviews the burden of the disease worldwide - clinical and economic, and how specific countries are attempting to deal with it. The next section covers the diabetes problem in Trinidad & Tobago, note being taken that according to the IDF the country has the worst morbidity and mortality statistics in the Western Hemisphere. The impact of the disease on affected families’ pocketbooks as well as the country’s economy is then elaborated, followed by the current approaches of the country’s public and private sectors to treat and manage the disease. An Action Plan is outlined which adopts the strategy that since type 2 diabetes is largely rooted in reversible social and lifestyle factors, the current medicalization approach of the more developed countries, is unlikely to be the solution for Trinidad & Tobago or any other country for that matter. It proposes that better diabetes care and outcomes will be achieved from a faith-based initiative in a community setting that empowers diabetics and their families to prevent, identify, and manage the disease. A specific proposal is also made to establish a Diabetes Registry within the MoH as a precursor to a much needed Diabetes Surveillance System.

A recent article in The Lancet, regarded by many as the leading medical journal, laments the lack of research on lifestyle interventions to address the worldwide diabetes epidemic, and states that “medicine might be winning the battle of glucose control but losing the war against diabetes”. The article goes on to say that “a strong, integrated, and imaginative response is required, in which the limits of drug treatment and the opportunities of civil society is recognized.” The proposals in this paper attempt to respond to this challenge. It uses conventional weapons – social support, outreach, consistent follow-up, preventive care, community and family education, in fighting this epidemic.
1.00 DIABETES – A WORSENING HEALTH PROBLEM

- Every year, 170,000 Americans die of diabetes or its complications.
- Every week, 12,000 people learn that they have diabetes.
- Every day, 144 people with diabetes go blind.
- Every hour, three people with diabetes must have a foot, ankle or leg amputated to save their lives.
- Every minute, 20 people with diabetes undergo kidney dialysis.
- Today, someone with diabetes will die from its complications.

Source: The Lions Club

1.01 An Attack on Human Well-Being.
In developed and developing countries alike no greater threat exists to the public health today than that posed by diabetes. It wreaks havoc on the body affecting just about all organs from head to toe. In the developed world where health statistics tend to be more robust, it is cited as the leading cause of blindness, end-stage renal disease and lower limb amputation, as well as the more commonly known and devastating attacks that it makes on the cardiovascular system. Unfortunately, the onslaught by diabetes on the human well-being is even more widespread than is generally realized by the public at large.

1.02 Signs & Symptoms of Diabetes: Common and Uncommon
Excessive thirst, a voracious appetite, frequent trips to the toilet to urinate, and weight loss, are some of the more commonly known signs and symptoms (S & S) of diabetes. In addition, most adults in Trinidad and Tobago society are cognizant of some relative or friend or acquaintance that is legally blind or gets around in a wheelchair because of diabetes, but the impact of the disease on the sensory system does not stop there. An article in the Annals of Internal Medicine cites diabetes as more than doubling the risk for hearing loss (1). On a parallel note, medical personnel are knowledgeable on how persistence of elevated lipids (fatty particles) in the blood, a hallmark of diabetes, affects the pancreas, but not about the risks associated with non-alcoholic fatty liver disease (NAFLD). Endocrinology Update recently published the results of a study which showed that the risk of death is 2.4 times higher for diabetics with NAFLD than for nondiabetics (2). Other S & S of diabetes in the GI tract include gastroparesis - delayed emptying of the stomach, diarrhea and constipation. Thus diabetes can be insidious on the one hand, and quite devastating on the other.

1.03 Mental Well-Being Not Spared
Nor is mental well-being overlooked. The Journal of the American Medical Association (JAMA) in its June 2008 edition reports that people with diabetes were at a higher risk for depression, and vice versa (3). Suffice it to say that diabetes is the antithesis of the World Health Organization definition of health: “a state of complete physical, mental and social well-being, not merely the absence of disease or infirmity”.

Source: The Lions Club
1.04 Diabetes and its Complications at Epidemic Proportions.
When the foregoing is coupled with the alarming rise in the incidence of diabetes - a phenomenon observed in developing and developed countries, it is of no surprise that the disease and its complications dominate the morbidity and mortality statistics of most. In a landmark document: *An Economic Tsunami: the Cost of Diabetes in Canada*, published by the Public Health Agency of Canada in December, 2009, the following is extracted from the Diabetes Fact Sheets:

- 80% of Canadians with diabetes die from a heart attack or stroke;
- 42% of new kidney dialysis patients in 2004 had diabetes;
- 30% of Canadians with diabetes will become blind;
- 7 of 10 non-traumatic limb amputations are the result of diabetes complications;
- 25% of people with diabetes suffer from depression;
- The life expectancy for people with type 1 diabetes may be shortened by as much as 15 years; and
- The life expectancy for people with type 2 diabetes may be shortened by 5 to 10 years.

This document also stressed that older Canadians are more likely to have diabetes. In 2005-2006, 22% of people (approximately 1 in 5) in the 75- to 79- year-old age group had been diagnosed with diabetes. This was almost ten times the proportion seen in Canadian adults aged 35 to 39 where the prevalence was 2.3%, or 1 in 43 (4).

In Australia the outlook is the same. The National Centre for Social and Economic Modeling is forecasting that the prevalence of Type 2 diabetes will nearly double over the next 40 years, that one in seven Australians will have the disease in 2050 at a cost of $14 billion in today’s terms. The report also projects that the prevalence of complications experienced by 1.6 million persons known to have diabetes will include 270,000 heart bypass operations, more than 250,000 strokes, and in excess of 750,000 kidney complications (5).

1.05 Factors Implicated in the Rising Incidence of Diabetes
This dramatic rise in diabetes now considered in most countries to be of epidemic proportions, is fueled by a number of factors:

- An aging population – the risk of developing type 2 diabetes rises with age;
- Rising obesity rates – obesity dramatically increases the likelihood of type 2 diabetes. It also accounts for the steady rise in Maturity Onset Diabetes of the Young (MODY) especially in the more developed countries where childhood and adolescent obesity is a burgeoning health issue;
- Increasingly sedentary lifestyles are contributing to rising obesity rates as armchair sports and games replace the more active lifestyles of yesteryear;
- People of African and Asian descent are 3-5 times more likely than persons of Caucasian descent to develop type 2 diabetes, and to suffer more in terms of complications such as kidney failure, when compared to Caucasian populations.
1.06 Economic Burden of Diabetes
The latest American Diabetes Association (ADA) commissioned economic study of the cost of diabetes in 2007 was published in March 2008. That study quantified the economic burden of diabetes in terms of its increased health care resource use (direct costs), and lost productivity (indirect costs). In the five years since the 2003 study, the number of Americans diagnosed with diabetes has risen from 12.1 million to 17.1 million, and the economic cost has skyrocketed from US$132 billion (equivalent to US$153 billion in 2007 dollars), to US$174 billion. Of the latter, US$116 billion was attributed to excess medical expenditures and 68 billion to reduced productivity. Of the excess medical expenditure US$27 billion was for care to treat the diabetes itself, US$58 billion to treat the complications of diabetes, and US$31 billion in additional general medical costs. The largest portion of medical expenses - 50%, was for inpatient care. On average people diagnosed with diabetes incurred medical expenditure that is some 2-3 folds higher than people without diabetes. One in five health dollars were spent caring for the person with diabetes (6).

As exorbitant as the figure US$174 billion appears to be, some analysts felt that the economic burden was underestimated since the study excluded: the costs associated with undiagnosed diabetes; the informal unpaid care and associated loss of productivity of family members; the intangible costs in terms of pain and suffering; health care system administrative costs; over the counter medications; and training, research, and infrastructure costs.

The US study is in accord with similar research in Europe. The landmark CODE-2 study evaluated the cost of managing over 7000 patients with type 2 diabetes in eight countries across Europe, the impact of complications on cost, and on the quality of life. Hospital inpatient costs were noted to be a cost driver. Medical expenditure in people with diabetes was reported to be around two-fold higher than the expenditure incurred by a matched population without diabetes (7).

The Canadian Diabetes Cost Model referenced earlier has found that diabetes is not only a personal crisis for persons living with the disease and their families, but is also a tremendous financial burden for the Canadian healthcare system and society as a whole. The Model found that:

- The economic burden of diabetes in Canada is expected to be approximately $12.2 billion in 2010, which is an increase of $5.9 billion or nearly double its level of 2000;
- The cost of the disease is expected to rise by another $4.7 billion by 2020; and that
- Interventions that reduce the prevalence of diabetes could significantly reduce costs
1-07 Prediabetes
Prediabetes refers to a condition where a person’s blood glucose level are higher than normal but not yet high enough to be diagnosed as type 2 diabetes. Diabetes can be diagnosed with a fasting plasma glucose (FPG) test which measures blood glucose after an overnight fast. In addition, an oral glucose tolerance test (OGTT) which measures blood glucose two hours after ingestion of a standard amount of glucose, may be used. According to the American Diabetes Association (ADA), patients with glucose levels of 100-125 mg/dL on a FPG test or 140-200 mg/dL on an OGTT, have prediabetes. Higher glucose levels define diabetes. Most people with prediabetes go on to develop diabetes: approximately 11% are diagnosed with diabetes within three years and more than 50% within ten years.

According to the ADA, screening for prediabetes is recommended for:

- all adults age 45 and older;
- all younger people who are overweight (BMI greater than 25) and have additional risk factors to include hypertension, cardiovascular disease, high triglycerides or low HDL (the good cholesterol), a sedentary lifestyle, nonwhite race or a family history of diabetes;
- and women who delivered a baby weighing more than 9 pounds or who were diagnosed with gestational diabetes.

1.08 Treatment of diabetes and prediabetes
The ADA recently published guidelines for the treatment of prediabetes. The cardiovascular treatment goals for prediabetes is the same for diabetes and are as follows:

- LDL cholesterol levels below 100 mg/dL
- HDL cholesterol levels greater than 50 mg/dL for women and 40 mg/dL for men
- Triglyceride levels below 150 mg/dL
- Blood pressure under 130/80 mm Hg; and
- Low-dose aspirin.

In addition the ADA has issued the following recommendations for persons diagnosed with prediabetes:

1. Lifestyle changes as a first step: exercising and eating a healthy diet (fruits and non-starchy vegetables, lean meats and non-fat dairy products). Results from the Diabetes Prevention Program (DPP) study found that people with prediabetes who lost about 10% of their body weight and exercised regularly (30-60 minutes five days per week), were 71% more likely to prevent or at least delay diabetes than those who didn’t. A recent DPP follow-up report indicates that this prevention or delay can persist for as long as 10 years (9).

2. No smoking and avoidance of excessive drinking of alcohol (1 drink/day for women and 2 drinks/day for men).

3. Prescription medicines like statins and ACE inhibits if the metabolic goals cited above are not achieved via the lifestyle changes as outlined (above).

4. If weight loss and exercise fail to keep the serum glucose in check then consideration be given to starting a drug such as glucophage or precose. Note: these 2 drugs are not approved by the FDA for the treatment of prediabetes.
1.09 Diabetes Self-Management
There is unanimous agreement that diabetes self-management (DSM) is of critical importance for achieving agreed-upon metabolic targets and a range of other outcomes. Diabetes care differs from acute or emergency illnesses which are largely managed by health care personnel. For example if you were to go to the ER with a laceration, a nurse takes immediate measures to stem the flow of blood and sterilize the area; a doctor would then apply sutures. Similarly if you were to go to your doctor’s office with chest pain, your doctor would listen to your chest and lungs with his stethoscope, a nurse would apply electrodes to your chest and do an ECG, and/or send you to a radiographer to have chest x-ray done, and so on. The point is you have little control of your care in these situations. Diabetes is different.

It has been estimated that more than 99% of diabetes care and 98% of diabetes outcomes can be attributed to people with the condition. DSM comprises the multiple tasks carried out by people with diabetes each day - every day. Decisions such as choice of food and when to exercise; of therapists and therapies; and approach to treatment, are made by people with diabetes every day. It is a complex undertaking but legions of studies have shown that DSM is the defining factor in managing diabetes as patients pursue improved clinical and quality-of-life outcomes over the short and long terms (10).

DSM has also been shown to produce savings in health care expenditure by reducing ER visits and hospitalizations. Given the foregoing, the goal for the decision-makers is how best to equip the patient to better manage his/her disease. The answer lies in pursuing a strategy that successfully educates the diabetic individual about the disease and provides an ongoing support base as the individual seeks to implement and sustain the behavioral and psychosocial adjustments needed to manage their condition over the long term. A Diabetes Support Management Education (DSME) that is fully integrated into a Diabetes Self Management Support (DSMS) system is the embodiment of such a strategy.

1.10 Traditional DSME
Numerous studies of noncompliance have shown that the traditional model of DSME is not effective in long term diabetic care. This model is lecture-based and designed to impart basic self-management information and skills to the diabetic, enough for them to make therapeutic behavioral changes in order to effectively manage their diabetes - what and when to eat, take medications, exercise, and deal with stress. This model resulted in noncompliance because of two significant shortcomings. The first is that the model was short-term, many being a single lecture-based session with or without some degree of follow-up. Patients were “fitted” into a set of predetermined self-management interventions with little attention to the “real-world” environment – behavioral, psychosocial issues, and life circumstances, that each has to face in the daily management of his diabetes for the rest of his or her life. Over the years it has become clear that no single program could meet such demanding requirements. DSME programs of today are better equipped to respond to these challenges. They are learner-centered and empowerment-based, and encourage and enable people to make changes of their own choosing by setting self-selected goals.
1.11 Empowerment-based Philosophy of DSME
Patient empowerment is defined as helping patients discover and develop the inherent capacity to be responsible for their own lives. The purpose of patient education within the empowerment philosophy is to help patients make decisions about their care and obtain clarity about their goals, values and motivations. Approaches to education within the empowerment philosophy incorporate interactive teaching strategies designed to involve patients in problem solving, and address their cultural and psychosocial needs (11). The *Diabetes Conversation Maps* and the *Power to Prevent*, are two of the “new” interactive teaching tools that reflect this changed philosophy for DSME.

1.12 Integration of DSME and DSMS
A key finding in the DSME study is that ongoing DSMS enhances and sustains gains made in empowerment-based DSME as described above. Studies have shown that while DSME is effective in the short term, the positive outcomes achieved as a result of education tend to decline after about six months. The second major change in DSME strategy builds on the premise that the health of individual community members is almost inseparable from the health of the larger community. Like a number of other chronic disease challenges, diabetes prevention and self-care are less dependent on “high-tech” clinical approaches than they are on “high-talk” efforts that provide social support, outreach, consistent follow-up, preventive care, community and family education, and community mobilization, all important components for ongoing DSMS (12).

1.13 DSME in Community Settings
The Task Force on Community Preventive Services in its 2001 report recommended that community settings are key potential sites for diabetes self-management education interventions to include community centers, libraries, private (nonclinical) facilities, and faith institutions. In these settings DSME facilitates ongoing DSMS (13).

1.14 Faith-Based Organizations
With the realization that without inclusion of lifestyle and behavioral strategies to complement the medical approach efforts to combat the diabetes epidemic will fail, it is the faith-based organizations (FBOs) in the U.S. that are surging to bridge the gap. On November 19, 2009, the N.Y. State Health Diabetes Campaign awarded an US$456,836 grant to faith-based organizations to mobilize communities in a year-long effort to spread programmes that help prevent, identify, and manage diabetes in places where people live, work, and worship. The target areas included New York City, Long Island, and the Hudson Valley. Specifically the bulk of the award is to be expended in training volunteers from the FBOs to lead a 6-weeks preventative programme (14). Such awards are hardly novel but up to this point in time were limited to African-American, native Indian-American and Mexican-American communities, ethnic groupings where the incidence of diabetes is known to be higher than the rest of the population.

That FBOs are emerging as invaluable partners, the cornerstones of diabetes preventive and health promotion strategies, seems only natural. FBOs acquire a strong foundation of trust from the congregants that cannot be replicated in community and government
organizations. With trust comes influence. Faith leaders are able to more successfully educate and implement new initiatives. Their congregants are more likely to open up about their problems and seek sources of change and comfort from faith leaders. By partnering with these leaders, DSME and DSMS programmes can proceed in an environment that facilitates learning and self-empowerment towards:

- Promoting healthy lifestyles that reflect religious, spiritual or moral values.
- Assuring that lifestyle changes recommended are consistent with religious or spiritual beliefs and cultural practices; and
- Creating support networks to help sustain lifestyle changes.

Thus spiritual mores are incorporated into the holistic model of disease prevention and health and wellness promotion (15).

Partnerships with FBOs have particular application in rural areas where access - limited personnel and space, may pose a problem. They may offer use of physical facilities such as parish halls, mosques, temples, etc, at no or low cost, for expansion of services including health promotion and screening. They can also augment the capacity of health care systems with services such as the provision of home health care, transportation, and meals, that allow persons to manage their health needs at home.
2.00 PREVENTIVE APPROACHES FOR DISEASE MANAGEMENT

There is a strong body of evidence to support the premise that preventive programmes at all levels of care reduce morbidity, mortality and the economic burden of diabetes, and improve the quality of life for all persons who have or at risk for the disease.

1. **Primary Prevention.** In the 2002 Diabetes Prevention Program study the findings were that people can prevent or delay type 2 diabetes by losing some 5-7 percent of their body weight; making healthy food choices (consuming less fat and fewer calories); and participating in physical activity (such as 30 minutes of brisk walking 5 days per week). See para 1.08.

2. **Secondary Prevention.** Recently a task force of experts issued a set of guidelines for people diagnosed with prediabetes. These guidelines are the same as the cardiovascular treatment goals for persons with diabetes, and have been adopted by the ADA. See para 1.08. Along with the primary preventive strategies described above, these recommendations not only prevented or delayed the onset of diabetes for persons diagnosed with prediabetes, but also resulted in cost savings and cost-effectiveness for those with the disease and already on oral antidiabetic agents and/or insulin. Gilmer and others modeled cost savings at an HMO and found that every percentage point increase in HbA1c above normal was associated with a significant increase in costs over the next 3 years (16). Testa et al noted that improved glycemic control was associated with short-term decreases in healthcare utilization, increased productivity, and enhanced quality of life (17).

3. **Tertiary Prevention.** Screening for eye – yearly exams by an ophthalmologist to detect early signs of macular edema, proliferative or nonproliferative retinopathy; regular foot exams to detect ischemia and/or decreased sensation (Weinstein filament); and urinary assays to uncover microalbuminuria, are the main tertiary care strategies. They have proven to be efficacious and of economic benefit when followed by appropriate treatments such as injection into the eye of an anti-endothelial growth factor, wearing of proper shoes and early treatment of foot infections, and use of ACE inhibitors. Better outcomes are achieved when these treatments are combined with primary and secondary preventive strategies.

2.01 Preventive Strategies at Different Levels are Inter-Dependent

Unfortunately, these scientifically proven and economically justified primary, secondary and tertiary programs, are not used routinely in the management of persons with diabetes (18). Reference was made in para 1.05 of the multiple factors that contribute to the diabetes epidemic. “Westernization” was cited as a major contributor, and is characterized by a diet high in fat and processed foods as well as total calories, and adoption of a sedentary lifestyle. Numerous studies have shown that these factors are becoming more rampant in developed and developing countries, the consequence being burgeoning overweight and obesity which impacts optimization of the preventive strategies outlined above. The Diabetes Control and Complication Trials (DCCT) have demonstrated that reduction of calories and fat intake are associated with improved weight and glycemic control; and increased physical activity with improved glycemic control.
3.01 Prevalence of Diabetes in Trinidad and Tobago.
Contributors at local and international meetings, cite the prevalence of diabetes in Trinidad and Tobago at between 102,000 – 145,000. Such data are derived from WHO and IDF sources, the latter via its landmark publication *IDF Diabetes Atlas* which is updated every 3 years.

The MOH of Trinidad & Tobago publishes annual prevalence rates for the 10 most common diseases based on data received from the Central Statistical Office (CSO) on discharges from the public hospitals. The local data so garnered, is generally regarded as grossly inaccurate for several reasons: no figures are received from Mt. Hope Hospital because its computer system is not synchronized with the MOH’s; the data received from the public hospitals fails to distinguish first-time admissions from repeat admissions; and it does not include data from the private sector which accounts for more than 80% of total health expenditure in the country. This last factor is not insignificant since what it means is that persons with the tell-tale signs of diabetes - excessive thirst, excessive urination and unexplained weight loss, is liable to be seen by a private doctor or admitted to a private hospital or nursing home.

The IDF data on the prevalence of diabetes in the region is not without its share of issues. Trinidad & Tobago is grouped in the North American and Caribbean (NAC) region which comprises 24 countries. Of the seven IDF regions, the NAC is noted for having the highest prevalence rates for diabetes - 9.2% or 28.3 million persons having been diagnosed with the disease in 2007. Some 68% of the adult population (ages 20-79) in the region resides in the U.S., 21% in Mexico, and 8% in Canada. The remaining 3% reside in the other 21 smaller countries. The high prevalence of abnormal glucose tolerance for the U.S. and Canada is a consequence of their older age distribution (19). It was noted earlier that the prevalence of diabetes increases with age.

IDF projections for all the Caribbean countries except Barbados, Guadeloupe and Martinique, are derived from Jamaican data, the differences in prevalence a consequence only of different age distributions for the islands. See table 1.23. It should be noted that for Trinidad and Tobago the projected prevalence rate for 2025 is the highest for the region. See Appendix I.

3.02 Mortality Rates from Diabetes in Trinidad & Tobago
Like the morbidity statistics, mortality statistics for diabetes in most countries have been found by several studies to be severely underestimated. Because individuals with diabetes most often die of cardiovascular and renal disease and not from a cause uniquely related to diabetes such as hypoglycemia or diabetic ketoacidosis, statistics based on death certificates most often underestimate mortality from diabetes. To address this issue WHO personnel from the Department of Chronic Disease and Health Promotion, developed a model of mortality attributable to diabetes based on estimates of age and sex-specific diabetes prevalence, relative risk (RR) of death for people with diabetes, all cause mortality rates, and population structure. They used Dismod II, a free downloadable
software program, to input these variables into a model that estimated the proportion of deaths attributable to diabetes.

With this model, the number of deaths were 3-4 times greater than those given in conventional international statistical reports, which are largely based on diabetes given as an underlying cause of death on death certificates. Given the prevalence cited in the morbidity statistics (above), it is not surprising that the mortality statistics for females in Trinidad and Tobago are the highest for the NAC region. See Appendix II.

The Dismod II computer model is a tool that relies on comparative epidemiology data in an attempt to avoid the chronic deficiencies of death certificates coding. Age and sex were the confounding variables used in the model while others such as hypertension, dyslipidemia, obesity and smoking, were not imputed (20). This severely limits the utility of the model, for example it cannot be used for evaluation of an intervention program aimed at controlling morbidity and mortality; and highlights the urgent need for development of a Diabetes Surveillance System.

3.03 Trinidad and Tobago Specific Information
Even though the mortality and mortality figures attributed to diabetes in Trinidad and Tobago were derived from formulae applied by experts at IDF and WHO and appear alarmingly high, information garnered locally (next paragraph), confirms that diabetes and its complications do represent an overwhelming burden of disease for the country’s population.

Recently released epidemiological information on diabetes in T&T is as follows:
- Of 1.3 million people, an estimated 143,000 persons (11%) have diabetes.
- 1,000 new cases were diagnosed in persons aged 20 years or older in 2007.
- Over 450 children in T&T have type 1 diabetes.
- T&T has the most persons with diabetes per capita in the Western Hemisphere.
- T&T is 5th in the world in diabetes per capita.
- 1 in 4 hospital admission is attributed to diabetes.
- Diabetes was the second most common cause of death listed in T&T (2007). Diabetes is likely to be underreported as a cause of death.
- **Overweight/Obesity**: 1 in 8 people in T&T is overweight. 80% of persons with type 2 diabetes are overweight.
- **Heart Disease and Stroke**: Adults with diabetes have heart disease and stroke rates about 2 to 4 times higher than adults without diabetes.
- **Blindness**: Diabetes is the leading cause of blindness in T&T.
- **Kidney Disease**: There are presently 365 persons receiving dialysis in T&T as an alternative for kidney transplant.
- **Nervous System Disease**: About 60% to 70% of people with diabetes have mild to severe forms of neuropathy – usually impairing sensation or pain in the feet and hands, slow digestion of food in the stomach, carpal tunnel syndrome, and other neuropathies. Severe forms of diabetic neuropathy contribute to lower extremity amputations.
• **Amputations**: More than 450 non-traumatic lower limb amputations occurred in people with diabetes last year. Foot problems account for approximately 14% of admissions and 29% of bed occupancy at public hospitals. 50% of persons who have lower limb amputations go into depression and 20% die within two years.

• **Erectile Dysfunction**: 74% of men who are affected with diabetes for over 15 years have erectile dysfunction.

• **Dental Disease**: Among young adults, those with diabetes have about twice the risk of periodontal disease. Almost one third of people with diabetes have severe periodontal disease with loss of attachment of the gums to the teeth measuring 5mm or more (21).

3.04 **Prediabetes in Trinidad & Tobago.**
According to IDF’s Diabetes Atlas, Third Edition (op.cit), there are 102,100 persons in T&T with prediabetes. This number is projected to go to 130,500 by the year 2025. Discrepancies are noted between IDF and WHO projections but such differences may be rooted in the variables applied to the formulae used by the two bodies. The experience garnered from research in more developed countries, is that in the absence of specific programs aimed at prevention or early detection, better than 50% of those persons with prediabetes will go on to full-blown diabetes. See para 1.07. As stated earlier, the most effective way to prevent diabetes is to lose weight and indulge in a sustained exercise program, neither of which has been adopted as a national strategy by the country’s decision-makers. In fact, at this point in time prediabetes does not appear on the country’s health radar as a problem to be addressed

3.05 **Economic Burden of Diabetes in T&T**
The IDF Diabetes Atlas also cites health expenditure in Trinidad and Tobago for diabetes to be $US35,377 millions in 2007, which translates into a mean of US$345 per person with diabetes. This contrasts sharply with the mean of US$835/person in Barbados and US$6,231/person in the U.S., two countries where the disease intervention model is more firmly entrenched. Even at this much lower level of expenditure for T&T, with 143,000 known diabetics in 2007, an estimated US$49,335,000 (TT$296,010,000) was spent on diabetes for that year. It is likely that these figures represent direct costs. If indirect costs such as loss of earnings due to illness or premature death, disability payments, time lost from work, etc, are factored in, then the economic debacle assumes even more gravid proportions with decidedly negative effects on the GDP.

3.06 **Economic Burden on the Family Pocketbook**
Since in T&T out-of-pocket spending outweighs all other forms of health expenditure (2004 figures), the burden on the individual family’s pocketbook is likely to be crippling as the patient copes with expenses associated with doctors visits, hospitalization, meds, labs, and the like - direct costs. Indemnity type health insurance is included in the benefit package of state employees and those working for large employers such as oil companies and banks. There are however dollar ceilings with this type of coverage and these are quickly approximated for diabetics with complications such as kidney and heart disease. Care is “free” in public sector facilities, but the service is perceived to be inferior, and is viewed by many as an option of last resort.
3.07 DSME: Low Priority in Private Sector
Although care in the public health sector is subject to much press coverage - mainly negative, in the print and electronic medias, dominant health care spending in Trinidad and Tobago is in fact in the private sector, some 80.3 percent of this private spending being out-of-pocket (OOP) – 2004 figures. This translates into a health care delivery mode that involves individual providers - mainly doctors, the result being that care is frequently fragmented, disorganized, and duplicated. Little attention is paid to the importance of patient self-management strategies as doctors focus on pharmacologic and technologic interventions with the short-term goals of relieving pain and avoiding hospitalization. This scenario is not conducive to the self-management training described earlier, considered essential to diabetes care and diabetic clinical and psychosocial outcomes. See para 1.09.

3.08 DSME in Public Sector: Traditional and Discontinuous.
Diabetes care in the public sector is perceived to be marginally better. Valuable professional staff - nutritionists, podiatrists, optometrists, and psychologists, rotate through multiple clinics, diabetic, foot, and eye, to name a few. Their numbers are few and the workload large; providers feel rushed and overworked, and patients shortchanged. Care can be described as a series of disease-management interventions that are sub-optimally coordinated and plagued by discontinuity due to the chronic shortage of these specialist personnel. Whatever little DSME is delivered, it is by public health nurses and nutritionists stationed at the inpatient and outpatient clinics. The advice and training are imparted in the traditional lecture-based fashion. See para 1.10

3.09 Diabetes Association of Trinidad and Tobago (DATT).
The DATT was incorporated by an act in Parliament in 1989. Its Mission is “to promote health in people with diabetes and to prevent or at least delay the onset of diabetes in those at risk through education, research and advocacy”. It boasts 25 branches with over 6000 members and are located in the more populous areas of Trinidad and Tobago. Members are assessed a fee of TT$20/year, and membership is open to diabetics and non-diabetics. Each chapter meets once/month usually at the local public health center where members receive lecture-based instructions on how to effectively manage diabetes. Attendance is taken at these monthly meetings but there is no obligation to attend. DATT is in a partnership with the MoH and receive a small subvention from the Government.

Each chapter advertises the date of its monthly meeting in the daily newspapers; many of the 6,000 odd DATT members were recruited via this medium. DATT chapters can be regularly found conducting screening exams at health fairs, company-sponsored events for their employees, parish hall meetings, and the like. DATT also sponsors a residential camp for young diabetics during the July/August school holidays. The youngsters are taught to self-inject insulin, manage their diets, how to recognize when their blood sugars are too high or too low, etc.

3.10 Trinidad & Tobago Health Science Initiative (TTHSI)
In October, 2007, Johns Hopkins Medicine International (JHMI) entered into an agreement with the Trinidad and Tobago Government, the MoH, the Ministry of Science,
Technology and Tertiary Education, and the University of Trinidad & Tobago, to form the Trinidad & Tobago Health Science Initiative (TTHSI). The overall objective of TTHSI is to foster the development of specialty and subspecialty clinical programmes for providing clinical care to citizens. Noting that Trinidad and Tobago has one of the highest incidences of diabetes in the western hemisphere, the aims of the diabetes service initiative are to:

- Improve the health of people with diabetes in Trinidad & Tobago.
- Build capacity for diabetes care, and
- Develop diabetes research in Trinidad and Tobago.

The intention is to improve screening procedures for diabetics and to provide additional technologies for the early identification of complications associated with the disease. To this end two service models will be assessed. One model will utilize the mobile concept where core staff will rotate among health facilities throughout a RHA; while a second, fixed model located in two permanent sites in another RHA will deliver a similar level of screening, education, and training. As a parallel activity a plan for the development of a Center of Excellence for Diabetes Services and Treatment is to be expedited.
4.00  A PREVENTION-BASED ACTION PLAN FOR TRINIDAD & TOBAGO

4.01 Plan Will Focus on Building Primary Care Preventive Strategies.
To be complete any prevention-based action plan to address the diabetes epidemic in Trinidad and Tobago must be aimed at all levels of care – primary, secondary, and tertiary. See section 2.00. The TTHSI effort referenced in para 3.10 is projected at improving care at the secondary and tertiary levels. The action plan outlined below is focused at improving care at the primary level by mobilizing communities, and building their capacity to better prevent, identify, and manage diabetes. It was noted earlier that better outcomes are achieved when secondary and tertiary preventive activities are integrated with primary care preventive strategies.

4.02 Build Capacity for Community-Based Action - Faith Partnership Initiative.
A community-based effort to build self-management skills among patients and families, to empower individuals, and to foster self-responsibility for health, will necessarily be labour intensive. The magnitude of the task should not be underestimated; the numbers are large. For example, prediabetics in Trinidad & Tobago number 102,000 (IDF statistics). As referenced in para 1.08, some 71% of these persons can have their situations delayed or reversed with a well-executed program of primary prevention comprising behavioral and lifestyle changes, and attention to nutrition. These are labour-intensive strategies and therefore costly. Given the constraints of the health budget due to the downturn in the economy, volunteerism coupled with collaborative partnerships between the state and NGOs and/or the private sector, present viable options.

Trinidad and Tobago is a multi-religious society with hundreds of congregations that span the nation. These congregations frequently have well-established volunteer networks that bring both person power and infrastructure to the task of improving individual and community health. These volunteers are often retired health and social service personnel who can expand the pool of diabetes providers with little additional cost.

It is proposed that a collaborative relationship between health care and faith based organizations be sought towards the development of key community partnerships aimed at building self-management skills, empowerment, and self-responsibility for health, for patients with diabetes or prediabetes.

What is envisioned is a faith based initiative in which teams comprising congregants nominated by their faith leaders, DATT members, and diabetic educators from the MoH/RHAs, will develop diabetes self-management plans that are guided by the goals, objectives, and resources of the respective communities. The team will be trained in the use of the appropriate tools as described below. See section 4.04. The Inter-Religious Organization (IRO) is the representative body for 25 religions with congregations in Trinidad & Tobago. Early consultation with the IRO on the feasibility of success with this aspect of the action plan, should be sought.
4.03 DSME in Community Settings.
As described in paras 3.07 & 3.08, referrals of diabetics in the public or private sectors for DSME are infrequent. Most of these professionals however, will agree that how a patient manages his or her disease is of critical importance for achieving agreed-upon metabolic targets and a range of other outcomes. They will also acknowledge that behavioural and psychosocial elements are critical factors in the overall management of the disease. Putting the infrequency of referrals aside, what little DSME there is takes the form of lecture-based teaching in RHA facilities, mainly health centers. This setting is not ideal for conducting contemporary DSME, and is not conducive to building the ongoing support that research has shown to be necessary for optimizing diabetic care and diabetic outcomes over the long term. See paras 1.12 & 1.13.

*It is proposed that DSME interventions be relocated to community-based settings such as community centers, parish halls, temples, mosques, and the like.*

The shift of DSME to community-based settings encourages and enables the empowerment philosophy as patients feel more comfortable when interacting with fellow community members in a familiar setting. It also facilitates the integration of DSME and DSMS.

4.04 Switch from Lecture-Based to Empowerment-Based DSME
DSME in Trinidad & Tobago at the present time is adherent to the lecture-based model. The self-management plan that epitomizes this model, is designed to fit the patients’ diabetes but not tailored to fit their priorities, goals, resources, culture, and lifestyle. Success is judged by the ability of the patient to comply with the prescribed regimen. To manage diabetes successfully, patients must be able to make decisions about goals, therapeutic options, and self-care behaviours, and assume responsibility for daily diabetes care. The learner-based, empowerment-based DSME model enables the patient to meet these requirements. See para 1.11.

*It is proposed that the lecture-based DSME as practiced currently in RHA facilities be replaced by learner-based, empowerment-based DSME in community facilities.*

The National Diabetes Education Program (NDEP) - a joint initiative between the Center of Disease Control and Prevention (CDC) and the National Institutes of Health (NIH), has developed a curriculum - *Power to Prevent: A Family Lifestyle Approach to Diabetes Prevention*, to help African-Americans learn how to apply type 2 diabetes prevention strategies in their own communities. *Power to Prevent* includes 12 effective, step-by-step lesson plans to help people take control of their eating habits and engage in a more physically active lifestyle. This program is adaptable by anyone interested in learning about the prevention of type 2 diabetes and will be used to train the Faith Initiative team.

4.05 Establish Trinidad & Tobago Diabetes Registry
As stated in paras 3.01 & 3.02, morbidity and mortality statistics for Trinidad and Tobago are generated from formulas applied by IDF and WHO statisticians, and are useful for making comparisons between countries. For example, according to WHO statistics the
prevalence of diabetes in Trinidad and Tobago in 2025, will be the highest in the NAC region. These data however, cannot be used to track ongoing efforts to control the burden of the disease; for example, the quality and effectiveness of any employed intervention strategy. What is needed for such purpose is a Diabetes Surveillance System (DSS). Establishing a Diabetes Registry is a logical foundation on which to build a DSS.

*It is proposed that a Trinidad and Tobago Diabetes Registry be created within the MoH utilizing information received from public and private labs, more specifically the dates and results of HbA1c tests, and patients’ addresses and dates of birth.*

Prevalence data so compiled will provide timely and relevant information about diabetes that can be used for policy and strategy formulation, and program generation; and ultimately for evaluation of public health interventions. Legislation will be needed to mandate laboratories – public and private, to forward relevant HbA1c data on a monthly basis to the Statistical Department of the MoH.
References