# Identification & Evaluation of Predictive Risk Factors for Type 2 Diabetes Mellitus in an Indo-Guyanese Cohort.
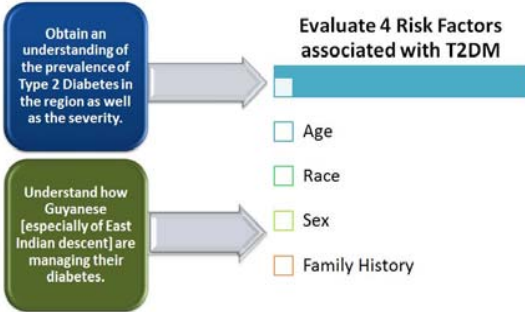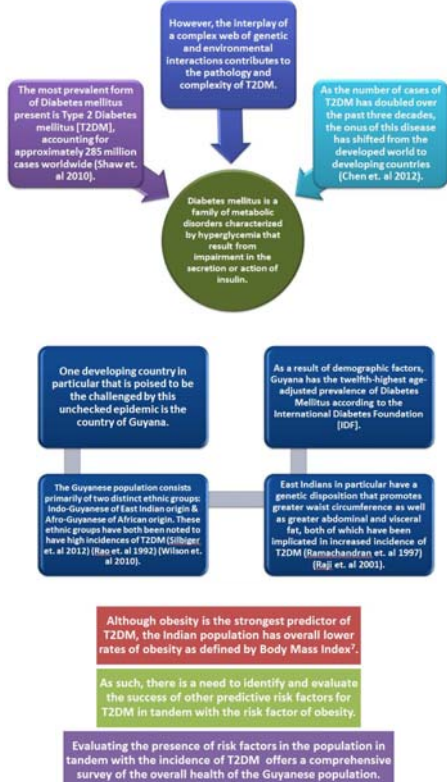
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## Study Goals & Purpose

- Obtain an understanding of the prevalence of Type 2 Diabetes in the region as well as the severity.

- Understand how Guyanese [especially of East Indian descent] are managing their diabetes.

**Evaluate 4 Risk Factors associated with T2DM**

- Age
- Race
- Sex
- Family History

## Background

However, the interplay of a complex web of genetic and environmental interactions contributes to the pathology and complexity of T2DM.

The most prevalent form of Diabetes mellitus present is Type 2 Diabetes mellitus [T2DM], accounting for approximately 285 million cases worldwide (Shaw et. al 2010).

As the number of cases of T2DM has doubled over the past three decades, the onus of this disease has shifted from the developed world to developing countries (Chen et. al 2012).

Diabetes mellitus is a family of metabolic disorders characterized by hyperglycemia that result from impairment in the secretion or action of insulin.

One developing country in particular that is poised to be the challenged by this unchecked epidemic is the country of Guyana.

As a result of demographic factors, Guyana has the twelfth-highest age-adjusted prevalence of Diabetes Mellitus according to the International Diabetes Foundation [IDF].

The Guyanese population consists primarily of two distinct ethnic groups: Indo-Guyanese of East Indian origin & Afro-Guyanese of African origin. These ethnic groups have both been noted to have high incidences of T2DM (Silbiger et. al 2012) (Rao et. al 1992) (Wilson et. al 2010).

East Indians in particular have a genetic disposition that promotes greater waist circumference as well as greater abdominal and visceral fat, both of which have been implicated in increased incidence of T2DM (Ramachandran et. al 1997) (Raji et. al 2001).

Although obesity is the strongest predictor of T2DM, the Indian population has overall lower rates of obesity as defined by Body Mass Index[7].

As such, there is a need to identify and evaluate the success of other predictive risk factors for T2DM in tandem with the risk factor of obesity.

Evaluating the presence of risk factors in the population in tandem with the incidence of T2DM offers a comprehensive survey of the overall health of the Guyanese population.

## Methods

**Random Blood Sugar Test of 50 individuals at Skeldon Hospital & Crab Water Creek Diabetes Outreach in Skeldon, Guyana on dates of May 19th & May 26th**
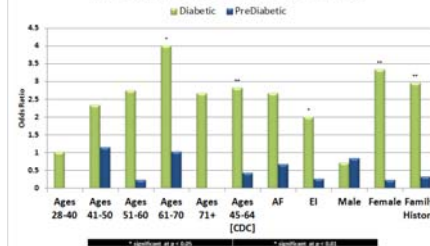
- 16 were asked to provide basic information including age, sex, and race.
- Used to develop an understanding of Region 6 Population and determine any differences between established values.

**Random Blood Sugar Test of 75 individuals at Skeldon Hospital in Skeldon, Guyana & Crab Water Creek Diabetes Outreach on the dates of May 22nd, 24-25th & 26th 2012**
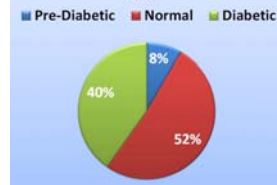
- 3 Members were excluded from formal analysis.
- Of 72 remaining individuals, 65 were of Indo-Guyanese [East Indian] descent.
- These individuals were asked to provide the following information with explicit permission: Age, Sex, Race, Family History of Diabetes, and Fasting Status.

## Results

### Predictive Power [Odds Ratio] of Assorted Demographic Characteristics [Accounting for Self-Identified Diabetic Status]

Diabetic    PreDiabetic

Ages 28-40, Ages 41-50, Ages 51-60, Ages 61-70, Ages 71+, Ages 45-64 [CDC], AF, EI, Male, Female, Family History

*significant at α = 0.05    **significant at α = 0.05

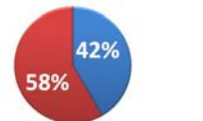### Classification of Population with Known Demographic Characteristics into Diagnostic Criteria Accounting for Self-Identified Diabetic Status

Pre-Diabetic    Normal    Diabetic

- 8%
- 40%
- 52%

### Classification of Self-Reported Diabetics Based on ADA Lifestyle Recommendations

- Number of Self-Identified Diabetics Compliant with ADA Recommendations
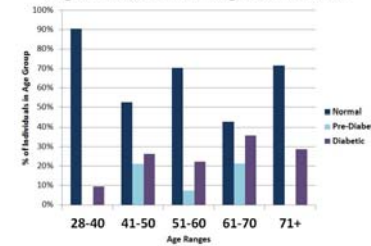- Number of Self-Identified Diabetics Non-Compliant with ADA Recommendations

- 42%
- 58%

## Results

### Females & Type 2 Diabetes

- Women were three times more likely to be diagnosed with Type 2 Diabetes than men.
  - 45 % of the Female Population were self-identified diabetics as compared to 15% of the Male Population.

- Women were twice as likely to be classified in the diabetic blood sugar range.
  - 29% of the Female Population were within the diabetic blood sugar range as compared to 15% of the Male Population.
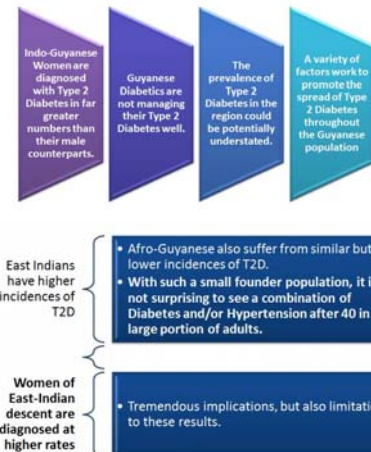
### Age Distribution of Diagnostic Criteria

Normal    Pre-Diabetic    Diabetic

Age Ranges: 28-40, 41-50, 51-60, 61-70, 71+

### Overall Summary of Results

| Mean Blood Sugar [mg/dL] of Overall Patient Population* | Median Blood Sugar [mg/dL] of Overall Patient Population* | Standard Deviation of Overall Patient Population Blood Sugar [mg/dL] * |
| --- | --- | --- |
| 158.2213 | 118.5 | 97.73962 |

## Discussion/Conclusion

### Summary of Results

- Indo-Guyanese Women are diagnosed with Type 2 Diabetes in far greater numbers than their male counterparts.
- Guyanese Diabetics are not managing their Type 2 Diabetes well.
- The prevalence of Type 2 Diabetes in the region could be potentially understated.
- A variety of factors work to promote the spread of Type 2 Diabetes throughout the Guyanese population.

**East Indians have higher incidences of T2D**
- Afro-Guyanese also suffer from similar but lower incidences of T2D.
- With such a small founder population, it is not surprising to see a combination of Diabetes and/or Hypertension after 40 in a large portion of adults.

**Women of East-Indian descent are diagnosed at higher rates**
- Tremendous implications, but also limitations to these results.

## Discussion/Conclusion

| Implications | Limitations & Qualifications |
| --- | --- |
| • Females have been cited to be more likely to be diagnosed with Type 2 Diabetes and suffer higher mortality outcomes.<br>• Cultural Factors may provide basis for increased diagnosis & underlying susceptibility. | • Small Sample Size of Males to be compared to.<br>• Large Variation amongst Data Set<br>• Patients may simply have run out of diabetic supplies and consequently had large blood sugar results.<br>• Inclusion of patients from clinic days may have represented a higher proportion of the diabetic population in the area. |

### Clinical Implications

The ages between 40 and 50 of East Indian descent contained the largest prediabetic population.

Approximately 11% of patients with prediabetes go on to develop diabetes each year (Ratner 2006).

Need for prophylactic intervention in this age group, especially considering the limited utility of obesity risk factor in population (Mohan et. al 2007).

In fact, the statistical association between the 45-64 Age Group and T2DM incidence was the strongest for any of the age groups studied.

Significant clinical complications from poorly managed Type 2 Diabetes a burden on already stressed public health infrastructure.

The lack of a definitive, causal linkage between demographic characteristics and outcomes of Type 2 Diabetes indicates that self-management plays an unheralded but indispensable role.

Frequent, intervention-based educational to promote lifestyle behaviors and self-management techniques appear to be an effective method of improving diabetic outcomes (Norris et. al 2002).

Culturally sensitive clinical recommendations that take into account socioeconomic factors appear to be more successful.

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## Acknowledgements